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Gunpowder and Dynamite Blasting.

STEAM and explosive compounds are powerful agents, each of which thus far has its peculiar domain—the first for the arts of peace, the latter for those of war; while both are the great civilizers of nations.

In the arts of war, attempts have been often made to utilize steam as a substitute for gunpowder, the chief explosive agent, but thus far with doubtful results, gunpowder holding its own against all attempted innovations, and therefore the use of steam in war has been confined to the transport of troops by railroad, and the propulsion of war-vessels, two most important inventions, which have changed the whole military strategy of our age. By the first-mentioned agency, field commanders are enabled to transport whole armies, for hundreds of miles, without fatigue, in less hours than formerly it took days of exhausting marches. The first application of the railroad on a large scale for these purposes was seen in our late civil war, and in the war of Prussia against Austria; the recent brilliant campaign of the Prussians in France has now added a third and crowning illustration. It was doubtless the rapid concentration of the German armies, by means of railroads, which gave them the means of overwhelming victoty.

By the second agency mentioned, the propulsion of war-vessels, marine warfare is still more changed, It makes commanders independent of the uncertain wind, and military strategists agree, that if the first Napoleon had had steam at his command to transport by water the immense armies he controlled, after having conquered the larger portion of the European continent, he would have easily accomplished his most intense desire, the conquest of Great Britain. Whether he could have held it permanently, is another question; but even a short temporary occupancy would have been a calamity to England too frightful to contemplate.

The first proof of the immense usefulness of steam-vessels, in marine attack, was given some forty years ago by the Prince de Joinville, son of the late Louis Philippe, at that time King of the French, in an attack on the fortifications of Morocco on the African coast; and it was the invention of heavy iron-clads, due to the stimulus given by our late civil war to American genius, that has brought this kind of offensive and defentive warfare to the present state of perfection.

But not only do the arts of war make notable use of steam, the great power nourished by peace; the arts of peace in their turn are encroaching on the domain of war, and are largely using that power which is the main reliance of war, gunpowder. It is certain that without this powerful agency many of the works now the admiration of the world could not have been executed—from the gigantic railroad and mining-tunnels piercing the hardest rock, down to the simple blasting of the rocks in order to make a proper foundation of a house, or for removing large boulders from farm lands, besides many other uses too numerous to mention.

We observed that in warfare gunpowder thus far had held its own, among all kinds of inventions and innovations in explosive compounds due to modern chemistry. This is due to two qualities not possessed in the same degree by proposed substitutes. The first is the slowness, or rather the gradualness, of the explosion, and its perfect safety against explosion by simple percussion. Gunpowder burns so slowly that the proper charge in a cannon or gun is not entirely burnt until the ball is leaving the muzzle. The ball is pushed forward with little velocity, when the first grains of powder ignite; this velocity, however, rapidly increases when more powder is ignited, and thus increasing, arrives at its maximum when all the powder has been ignited, at which moment the ball should leave the muzzle. An overcharge of gunpowder will throw out a portion of unburnt powder with the ball, which is a striking proof that powder burns slowly. In fact, it is well known that a few ounces of unconfined powder will not explode, but only burn with a slight puff; while in a narrow train of gunpowder, of say ten or twenty feet long, the progress of this slow combustion can be easily followed by the eye. The ejection of unburnt powder from a gun may cause surprise; but gunpowder not only burns slowly, it requires time to take fire; it may be thrown through the flame of burning alcohol, and will not burn, but reach the alcohol under the flame, and be found at the bottom of the same unburnt. A spark from an electric friction machine will fail to ignite gunpowder, but only scatter it around, unless we interpose in the wire conducting the current some imperfect conductor—for instance, a piece of wet thread or rope; this will retard the passage of the current to such a degree that the time the spark lasts will be prolonged sufficiently to accomplish the ignition of the gunpowder through which it passes.

The substitutes proposed for gunpowder in warfare are, for the greater part, so rapid in their combustion that every particle is burnt in the gun before the ball has had time to move a single inch, producing such an instantaneous, hammer-like blow on the breech of the gun as to cause it to burst, before the ball has had time to reach half the length of the muzzle. Such substitutes are therefore better adapted for exploding the mines, blasting rocks, and in general for all purposes where we require a destructive agency and not a propelling force, able to overcome gradually the inertia of a heavy mass like the cannon ball. This is the simple reason of the great effectiveness of nitro-glycerine, or its modifications, called dynamite, giant-powder, etc., in rock-blasting—an effectiveness which has allowed the driving of tunnels to be successfully prosecuted under circumstances where the work would perhaps have been abandoned if only the common gunpowder had been at command. This is the case to a certain extent in the Mont Cenis tunnel, in our Hoosac tunnel, but above all, in a railroad tunnel now being driven in the neighborhood of Vienna, Austria, where, after the work had been commenced, the nature of the rock changed, to the surprise of the geologists, and presented a feldspar and quartz, both of a desperate hardness never seen before; this compelled the engineers to give their attention to more powerful blasting-powders, and immediately comparative experiments were undertaken, conducted with the proverbial German thoroughness. The purpose of these experiments was to find the relative effects of gunpowder and dynamite. The result was published, and an extract of the same we have now the pleasure of laying before our readers.

In using gunpowder it is necessary to incline the bore-hole to not only always acts to the full depth of the hole, but crumbles the rock below, usually to a depth from one-quarter to one-third the length of the hole, as represented in Fig 2.

There is still another important advantage in the use of dynamite, namely, as a considerably less volume of dynamite produces the same effect as a large volume of gunpowder, the hole may be bored much smaller—another saving of time.

Experience has shown that by the use of dynamite the most advantageous depth of the bore-holes in very hard rock is from two to four feet, in case it is bored in a flat surface, supported on all sides, and where thus the blast can only remove the material in the direction of the bore-hole. A peculiar property of dynamite is, that if in the above case the bore-hole is deeper than three or four feet, the effects of the blast beyond the hole become less; for this reason, this depth has been accepted as the maximum under the above circumstances.

When, however, the rock has two or more free surfaces or faces, bore-holes of eight to twelve feet, and deeper even, have proved useful. Such a case is represented in Fig. 3. They then tried the comparative effects on a flat surface, supported on all sides, of two bore-holes eight feet deep and two inches diameter, or several holes of two to three feet deep and one inch diameter, of which the number was such that they together contained the same charge as the two holes of eight feet deep. The result was, that the effect of the great number of smaller holes was sixfold that of the two large ones.

The most striking illustration of the economy of the use of dynamite is obtained when the rock is situated in layers, as represented in Figs. 4 and 5. If gunpowder is used, several blasts are required, (see Fig. 4;) while with dynamite a single hole through several layers will produce more effect, (Fig 5,) the dotted lines indicating the limit of the action in the two cases.

Another advantage is, that the dynamite will never discharge its force and waste between the layers of rocks, which is so often the case with gunpowder.

The most convenient form in which to use dynamite is that of cartridges, made by NOBEL, of Hamburg, These are of cylindrical form, three-quarters to two inches in diameter, and from one to eight inches long, covered with parchment-paper. By their use a considerable saving of time is effected in loading, besides which, they are much less liable to explode, and the

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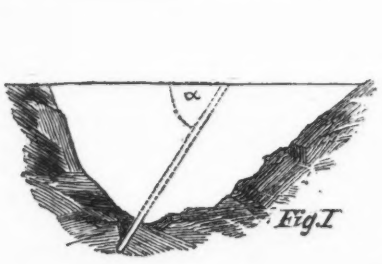

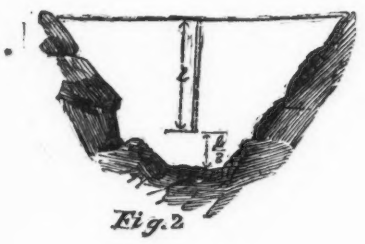

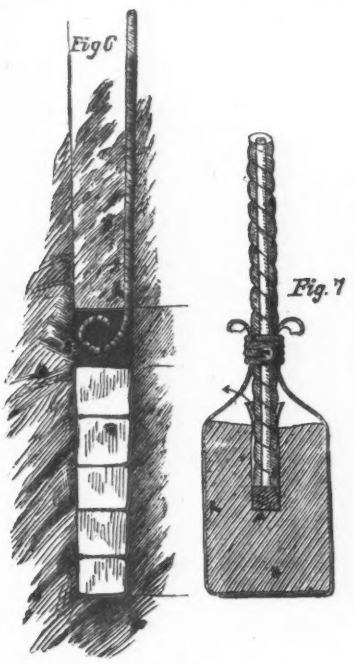

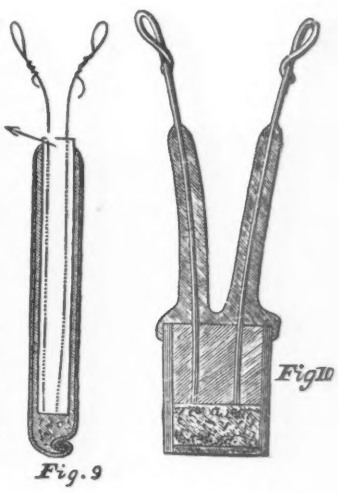

GUNPOWDER AND DYNAMITE BLASTING.

Mining Schools.*

THE next business was the discussion of the following paper, previously read, from the pen of Mr. T. COOMBER, on "Mining Schools."

It being understood that the members of this Institute are anxious to see an attempt made to establish mining schools in the South Wales district, the writer having been connected with such a school since its establishment, fifteen years ago, and having gained by this an experience which he thinks may be useful in carrying out these views, offers the following remarks:

Mining schools of two grades have been successfully established upon the continent. The higher schools offer an education suitable for the superior officers of mines, while the lower schools are intended for the instruction of subordinate officers and working miners. Those who want the higher education can, generally speaking, command resources which will enable them to go home and seek it; but the working miner and petty officer must have education brought to them. This paper, therefore, proposes to deal rather with the more immediate want—the lower schools. One of the best institutions of this class is the Miners' School at Tarnowitz, in Southern Silesia. This school is so worthy of imitation in its aims and plans that it will be well here to give a short sketch of its organization. The education of the school is gratuitous, but only those can be admitted who have worked at least a twelvemonth underground, and who can bring a certificate, from the masters, of industry, steadiness, intelligence, and punctual regularity. They must also pass an examination, which tests their knowledge of elementary arithmetic, and their powers of writing German correctly. The students support themselves by finding employment in the mines of the immediate neighborhood. They go down in the first shift, and come up in time to attend the school in the afternoon. The hours of meeting are from two to six—the first two hours of every day are given to the study of surveying and dialling, and to the practice of plotting from notes. The remainder of four afternoons in the week is devoted to improvement in writing and composition, to keeping accounts and mine-books, and to elementary mathematics. The last two hours in the remaining afternoons of the week are employed in lectures upon practical geology, mineralogy, and mining; one of the engineers of the district undertakes this work; all else is done by an intelligent elementary teacher. One cannot but be struck with the useful, though unpretentious, character of the instruction here attempted, and the consequent prospect of the school's success. Four different attempts have been made to establish somewhat similar schools in this country since the exhibition of 1851. The first was at Truro, in Cornwall. This school owed its origin to the exertions and liberality of Sir CHARLES LEMON. It was an expensively conducted school, and but a small fraction of the expenses was met by the fees of the pupils. This sufficiently accounts for the failure of the effort here, for, although no difficulty is experienced to get together the funds to start a mining school by voluntary subscription, all experience goes to show that this source of income is not to be relied upon to sustain its continued existence. The next school offered to the mining public was that at Bristol. This school was established by the exertions of Mr. HANDEL COSSHAM, of Mangotsfield, and the late Mr. HERBERT MACKWORTH. It has now been at work fifteen years; during this time it has educated a number of working miners and others, who now occupy important posts in the management of mines. Although this school was carried on under the roof of the Bristol Trade School, the two schools were not in any way connected, during the first seven years of their existence. Messrs. COSSHAM and MACKWORTH had found no difficulty, at first, in collecting subscriptions towards the support of the school, but these diminished, year by year, until Mr. COSSHAM was almost at the sole charge of the expenses of the establishment in excess of the students' fees. At last, however, Mr. COSSHAM ceased to feel satisfied in putting himself to further expense, and it became necessary to close the school, or make it pay its own expenses. The latter alternative was adopted with success—the following changes being made: Up to this period a mining master had been employed, to devote all his time to the students, while the subjects taught by him, that were not connected with mining pursuits, were also at the same time taught in the Trade School. This was waste effort; and a mining engineer of local reputation was therefore engaged to teach the mining subjects, while instruction in other subjects was given by the masters of the Trade School, the head master of which now took charge of both institutions. The character of the technical work was improved by a very able delineation of a course of instruction, by that eminent mining engineer, Mr. GEORGE GREENWELL, and the school fee was raised to £10 per annum. The result has been that there is now every reason to hope that the school will continue to live. The work is annually tested by the Department of Science and Art, with satisfaction to all concerned, and the authorities of the Metropolitan School of Mines have encouraged the school by offering it an annual free exhibition to their institution. Some years after the Bristol school commenced to work, a mining school was opened at Wigan; but it is now closed, and the writer has heard that the want of funds was the cause of its failure. The Glasgow school was the next of its class. A number of gentlemen connected with the mining industry of that neighborhood subscribed a large sum to establish and support it for three years, and the gentleman who was the master of the Bristol school, Mr. MARK FRYAR, was offered an increased salary to accept the post of teacher there. In that gentleman's hands good work seems to have been done, and many valuable miners were trained in the school. But at the end of three years the usual difficulties again presented themselves. Gentlemen who had been enthusiastic at starting, at the end of three years were no longer prepared to lend their help; and in the very midst of its usefulness, the school was obliged to be closed for the want of money to carry it on. The Bristol school is, therefore, the only school of its class which has been established for the purpose of teaching the elements of the sciences applied to mining which continues to exist; and this is solely because it has had the Trade School to lean upon. Moreover, the writer believes that no effort to establish teaching in mining will be successful which attempts to stand alone. A mining class may pay its share of the general expenses of an educational institution to which it may be attached, but it cannot do more. Still, this teaching is much wanted, and will be readily paid for to the best of their ability by many who want it. The State only assists the teaching of the operative class. For all others, therefore, the teaching of mining must be virtually self supporting, and the following suggestions are offered with a view to that end.

It has already been said that the working miner must have education brought to him; he cannot afford to leave home for it. This, it is conceived, may be readily done by the employment of the well-understood system of night schools. Such a school might be established in a situation conveniently accessible to the men of several large mines. The subjects taught should be those of the Tarnowitz school. The elementary department might be placed into the hands of the local schoolmaster, a weekly visit being made by a mining engineer who had been appointed to the post of instructor in technical subjects. Such a master should be able in this way to keep four of these local schools at work. No difficulty would be likely to occur in obtaining rooms for carrying on this instruction. The committees of national and British schools would gladly open their doors for such a purpose, while the masters of such schools would no doubt be equally glad to take charge of the classes for the sake of their share of the emoluments which might be secured. Such establishments as these would make careful miners and bailiffs, but the district would demand a higher education for those who would fill superior positions to these. This might be attempted at a central school with an organization similar to that at Bristol. The mining master would be engaged in teaching his subject every morning at this central school; this would leave him free for his night work in the local classes, while his Saturdays would be devoted to accompanying the students on visits of inspection to the mines in the neighborhood and upon surveys. It would not be difficult to find a suitable home for this central school; every town now has its good grammar school where mathematics and the elements of natural science are taught, and such a school would gladly accept the addition to its income which a mining class would afford. Proper apparatus would, of course, be necessary, such as drawing-boards, black boards, geological maps, diagrams and sections, plans and elevations of mine machinery, etc. There should also be a collection of minerals and geological specimens, and it would be very desirable that a fair laboratory should be provided where assaying and analysis could be taught. The next consideration is the sources of income which such a Mining School may legitimately calculate upon. It must be remembered that it must pay its own way, and that subscriptions are not to be relied on. Still, the expenses incidental to its establishment might thus be met; such as the cost of fittings, advertisement, and printing, the purchase of apparatus, diagrams, models, minerals, etc. There will always be found gentlemen who are willing to assist to this extent. But after this, so far at least as the higher schools are concerned, the work must stand on its merits; nor will it do so at any risk. A grammar school, in a mining district, would monopolize the educational work of the district, so far as the sons of mining men were concerned, if arrangements were made to give this kind of teaching. And these gentlemen would very willingly pay such an additional fee for this work as would compensate the school authorities for any increased expense to which they might be put, and provide a proper income for the mining master. With regard to the lower schools, the Government will here step in with very generous assistance. Towards the purchase of apparatus, it will contribute one-half the cost. It will not only encourage the elementary teaching by premiums, upon examination successes, but will examine in all sciences applied to mining, and reward the teacher with sums not exceeding eight pounds for each pupil's success in each subject, and the pupil himself with prizes of books and instruments. Moreover, they will pay the teacher's travelling expenses from the central school to the outlying district schools. With these sources of income, it would not be difficult for any qualified and energetic teacher of mining to make really good remuneration for his labor. This might not be the case at the commencement of the work, and this difficulty could be met by the subscription of a guarantee fund by the friends of the movement. But this is all that should be asked for, and it should be very discreetly employed. A system of uncontrolled guarantees only deprives teachers of proper energy and industry, so that, even to begin with, such a scale of assistance should be adopted as would leave the master a gainer by the increased success of his work. And if the guarantee fund became exhausted without establishing the success of the project, provided proper attention has been given, the attempt should be abandoned; continued subsidies can only prolong an unhealthy existence. Still, there can be no objection to the raising of a small sum for the purpose of stimulating the industry of students by offering them local prizes as rewards for assiduity.

There is now only one point in the scheme which has been laid down that remains to be discussed, and that is the management. If the work that has been delineated is not to fail, it must be well watched; no neglect or inattention must be allowed to jeopardise its success on the part of any one concerned. There should be an active committee chosen by the gentlemen who have subscribed the guarantee and prize fund. This committee would probably consist of nine proprietors, and could not, therefore, come together during the working part of the day. They should, therefore, meet in the evening. But, to sustain the continued interest of such gentlemen in the affair, real work must be given them to do, and real work would be found if they met periodically for the purpose of examining the pupils of the various classes under their surveillance. If this part of the plan be rigorously carried out, vigorous work and attention will be found to characterize every department of the undertaking. But the questions may occur: "Would the management of a grammar school submit to receive the visits of inspection which have been spoken of?" A difficulty will hardly be experienced here. If the management of the school in question be in the hands of a local body, there would most likely be active co-operation; and if in the hands of the head master, being a private undertaking, he would doubtless be a commercial gainer by the addition of the mining element to his school, and his interest would lie in encouraging any means of making this additional teaching thorough and good. Such are the outlines of a scheme by which it is believed at very little expense a suitable and eventually self-supporting education may be provided, both for the colliers and overmen in the neighborhood of the mine, and for the young people who will eventually become managers, and whose general education may be going on at the same time. Indeed, it is asserted that the teaching which has been delineated here may take the place of much that is done in the grammar school, not only with advantage to the student, in so far as he will be acquiring information useful to him in his future calling, but with no positive loss to his education; as much that is taught in such schools has but poor justification when the object is to train young men who are to be engaged in industrial pursuits. Of course, it is not pretended that advanced scientific instruction, such as that offered at the Paris School of Mines, for example, could be obtained in the classes affiliated to local schools; and a desire to see established a school in which the highest possible teaching could be obtained can be well understood. Still, very useful work may be done in the humble manner that has been suggested, and it would be wise to be contented, at first, with the less ambitious undertaking, for two reasons. First, that an ability to manage the higher organization may be acquired in dealing with the lower one; and secondly, that students may be provided who are capable of taking advantage of such higher education by preliminary training in the lower schools. The higher school can only succeed, also, by being thoroughly self-supporting, and if so, it must do its work well, and if the work is to be well done, a proper surveillance is necessary. The danger to which such schools are liable is this: Its teachers take a standing from their position in the school which readily finds for them professional employment, and at last this professional employment takes up so much of their time that their teaching becomes perfunctory to the extreme degree. Now, if people pay for the education of their sons, they expect their teachers to charge themselves with the duty of instructing them, and insisting upon their proper industry. But the mere recital of a course of lectures will do very little in this way, and the management of a higher Mining School must be content with nothing like this. They must ask for such fees as will give their teachers respectable incomes, who must then be called upon to devote their whole energies to the work they are engaged to do; and, as much as possible, diligent class-room teaching should be made to supersede the very unsatisfactory system of lectures.

But it must not be forgotten that most of the sciences which are applied to mining are also common to other industries, and that these other industries of necessity congregate in mining fields, such as chemical and machine-making factories. With very little additional expense, the arrangements might be also adapted to the requirements of those to be engaged in these industries, with a consequent increase in the range of the constituency from which pupils would be drawn out of all proportion to the consequent increase of expense. There is much in the organization of the new College of Science at Dublin that would be worthy of attention to this end. It has been assumed that the pupils of the higher school should bring into its treasury a sufficient sum to pay the costs of its working; and, speaking generally, those whom circumstances permit to devote time to such studies are those whose friends can well afford and should be made to do this. Still, there will be cases of young men showing in the lower schools such ability as will make it desirable, in the interests of industry, to foster and cultivate their talents. The trustees of the school—those, probably, whose exertions and influence brought together the money for its establishment, and were virtually its founders—should endeavor to raise a fund for this purpose. The Government recognizes the importance of giving such help, and will place in the hands of a deserving student, for defraying the expenses of his education, £25 per annum for three years, provided his locality will place in his hands a similar sum. In this way the school should be no pecuniary loser by the introduction of such men, while it would be a great gainer by the spirit of work they would bring with them. These remarks may be fitly concluded by the recapitulation of the two leading ideas enforced by them; the teaching of mining must be self-supporting, and to be self-supporting, must be made to deserve support.

Mr. R. BEDLINGTON inquired the course of instruction at the Bristol Mining School, and the class of persons who attended.

Mr. COOMBER said the school was worked in connection with the Trade School, and the object of the Trade School was to educate young people who were to become connected with the industry of the country. No attempt was made to teach handicrafts, but an attempt was made to teach sciences applying to handicrafts and industry. They had provision for making the English education of those who attended sound and perfect; and if a young man went to them whose object it was to enter a

* A paper read by Mr. T. COOMBER before the South Wales Institute of Engineers.

mining institute, his wants were of course met if he were unprepared.

But the characteristic of the school was the teaching of the sciences applying to technology. The basis of education was mathematics. Mathematics was applied to mechanics and machinery. They taught experimental physics, chemistry (organic and inorganic), prescriptive geometry, etc., and, in addition, for those engaged in mining, they had a course of lectures on mining technology, which Mr. MORGANS, who had a paper to read that day, had charge of. Education in mining was not confined to the class-room, a considerable portion of the time of the student being occupied in the field in the practice of surveying, and in visiting collieries in the neighborhood. He thought that shortly delineated the work they attempted to do. With regard to the class of young men attending, they drew their students from all classes. They had at the present moment the grandson of a former Prime Minister of the country; and they had also a man who had come from the North as a working collier. Between those two grades they had all classes. Mr. MORGANS had conceived an idea as to the farther development of mining organization which was not touched upon in his (Mr. COOMBER'S) paper. Mr. MORGANS thought it possible to carry on the technical education of the mining student, of which he had spoken, to a larger extent in connection with the practical education of the student. Mr. MORGANS proposed to attempt a scheme devoting half the time of the student to the working and observation of mining pursuits. Mr. MORGANS had the opportunity of introducing students to a small metalliferous mine, in which he had an interest. The scheme was quite new in connection with the mining education of this country, but he believed it had been, to some extent, adopted in Frieberg. A portion of the student's time was engaged in the class-room, but a considerable portion was occupied in mining itself. Mr. MORGANS intended to attempt a little more than was attempted at Frieberg, but, probably, upon that point Mr. MORGANS himself would speak with more clearness and with greater usefulness.

Mr. MORGANS, JUNR., considered the great defect in the present system of mining education was a lack in the practical part. He thought most of the mining students who had passed through their training, when they were supposed to have finished, had too much of the character of "drawing-room" mechanics. Students required to have an intimate acquaintance with the essential elements of mining. There was no possibility of affording that information without having a mine in connection with the school itself, and allowing the student to devote a portion of his time to the actual use of tools. It was with a view to the accomplishment of that object that they had opened the scheme to which Mr. COOMBER had referred. His idea was that the defect of the present system of education would be met by some means of affording practical acquaintance with mining, which could only be adequately acquired by the actual use of tools.

Mr. VIVIAN, after expressing the interest with which he had read the paper, said Mr. COOMBER was partly correct in speaking of the cause of the failure of the Cornish Mining School, as arising from the support given by men of influence, rather than being pecuniarily supported by the pupils. But he thought much of the disfavor with which the school was viewed arose from ignorance. In a lengthy speech, Mr. VIVIAN explained several local causes, which, in his opinion, militated against the institute, notably the selection of Truro for the school, which, eighteen or twenty years ago, was not so much of a mining district. The speaker quoted the letter of a gentleman, in which the writer said: "I consider the cause of failure of the late Cornish Mining School was the want of a popular feeling in its favor at the commencement. Cornish mine agents generally have risen from the ranks, and the consideration of their success, with the very limited education most of them had received, was a great inducement for them to think that their sons should go and do likewise. Hence, many of them were unwilling to pay more than a few shillings a quarter for their son's education, and in fact only a few of them had any idea of what the education was to be, or of what was its value. Again, suppose the appointment of the teachers afforded a subject for dissent; and if the school had been established at Camborne instead of Truro, those who spoke so disparagingly would have had at least, one cause of dissatisfaction removed. Again, I believe there were other errors which I will not now enlarge on. In my opinion, for a Mining School to prosper, it must be popular among those for whom it is intended, there must be a feeling of need for the education offered, and a willingness on the part of the people to pay for it, if it cannot be otherwise obtained; and there must be a confidence in the teachers that they know their business, and are willing to labor for those requiring them." But since the failure of that school, another attempt had been made in Cornwall, and though it had not flourished as might be wished, it was doing a great deal of good. They employed a certificated teacher, and had some little assistance. But the mode of conducting the Institute was not so much like a school, but receiving men who had had a practical education in working in a mine—some miners' sons, and others, educated young men, who had had a preliminary education in the working of mines. A hundred young men were under instruction, and of these seventy-eight had passed an examination in one department or another—34 in mineralogy, 30 in chemistry, 5 in geology, and 9 in mining.

Mr. BEGG said he had had the privilege of being connected with a mining school, and the class of men attending ranged from working colliers to mining and civil engineers, and sons of colliery proprietors. The subjects taught included mechanical and other drawing, illustrative of mining engineering, the different methods of working coal and other minerals, the ventilation of mines, timbering and other measures of supporting roof, different methods of boring for minerals, sinking, holeing and tubbing of shafts, etc., etc. In further remarks, the speaker quoted Dr. LYON PLAYFAIR, as showing the necessity for mining schools of the character which had been indicated in the course of the discussion. He trusted the day was not far distant when they would not only have a mining school, but a school to give technical education to all interested in such an institute as theirs.

Mr. SNELUS expressed his surprise at the paucity of mining schools in Wales, and advocated their establishment; but he thought the schools should be taken to the men, and not the men to the schools. The difficulty was to begin. A certain amount of patronage should be bestowed on this kind of school, but his experience was, that people valued that most for which they themselves paid; and for a school to be successful, it must be supported more or less by the payments of the students themselves. As Mr. COOMBER had said, he himself had found all classes of persons attending these schools; both laboring men and the higher classes were interested in them. It seemed to him, in order to make science schools successful, employers should require young people who engaged at their works in any particular branch to have a certain technical knowledge of that branch before they started work, just as much as in many parts of England, it was now required that they should have a knowledge of "reading, writing, and arithmetic."

In reply to the President, Mr. SNELUS said he had found the greatest element of success was the teacher himself.

Mr. MCMURTRIE referred to a custom in the North of England of taking young men of thorough education and placing them under a practical colliery viewer. In no case could a mining school be made a substitute for a system of that kind. After the usual school, a mining school was a useful adjunct, but they must teach practical mining as well. He did not think capitalists would be willing to take men from mining schools and give them important positions; they must first go to some colliery, and acquire that practical knowledge of details without which mining could not be carried on.

In answer to Mr. COOMBER, Mr. MCMURTRIE said that he meant that a mining school should be a connecting link between the ordinary school education and the education to be acquired at a colliery.

Mr. VIVIAN said, speaking from his experience, no man would, in a metallic mine, be employed as manager, unless he had practical acquaintance with the working of a mine. He must be able to take off his jacket, and show the miners how to work underground.

Mr. COOMBER, in replying upon the discussion, said they might be astonished, but he had known young men, after studying at the school for a couple of years, appointed managers of mineral property; but, inasmuch as a Mining School had demonstrated itself by experience adapted to introduce men to mining work, the necessity of practical training, side by side with technical training, had pressed itself upon them. He was not prepared to say what was the value of the training a young man got with a civil or mining engineer, but it seemed to him that Mr. MORGANS' suggestion offered exactly the same kind of education that a young man would get with a mining engineer—a practical observation of the working of a mine, in addition to the technical education, in which the right understanding of all operations of mining consisted. The speaker dissented from the view of some gentlemen that patronage was necessary for a Mining School; he did not believe it, and he appealed to facts in his own experience in support of that opinion.

The PRESIDENT said, no doubt mining and scientific schools were productive of good, if the education was associated with actual practice in mining. Without that, they simply gave a superficial education, which, when a man came into a responsible position, ended in simple failure. So far, he thought, such schools had been anything but successful for any length of time. The Glasgow and Bristol schools had been very flourishing at one time, but of late they had not been so well supported as they deserved. But he thought the matter was well worthy of their grave consideration.

Mr. COOMBER: May I interrupt you for a moment? Your remarks don't apply to the students. We have done without patronage.

The PRESIDENT: As far as Glasgow is concerned, I refer to the students as well.

On the motion of the PRESIDENT, seconded by Mr. BASSETT, a vote of thanks was accorded to Mr. COOMBER for the paper which he had presented to the Institute.

Gorman's Patent Gas Furnace.

A GOOD deal of interest is at the present time being manifested throughout the iron trade of the West of Scotland, as regards the best puddling furnace in the market. Three recent inventions claim, in some respect or another, superiority over all rivals. The oldest of these is the patent heat-restoring gas furnace of Mr. WILLIAM GORMAN, engineer, of Glasgow; and as the other two—the patents of Mr. ELLIS and Mr. FERRIE respectively—have not as yet been so successful, so well developed, or brought into such general use as Mr. GORMAN'S furnace, we shall now consider the latter in detail, reserving a description of the remaining two for subsequent articles.

So far back as the year 1854, Mr. GORMAN obtained a patent for an improved puddling furnace. From that time until 1863, he devoted constant attention to the subject of perfecting his invention. In the following year (1864,) his improved heat-restoring furnace was introduced into Govan Bar Iron-works. It did not, however, meet immediately with the success it has since attained. Puddlers, as a rule, are opposed to new inventions, and in regard to Mr. GORMAN'S patent, they either found or pretended to find such a difficulty in working it that its use was, for a time at least, abandoned. Subsequently, however, the heat-restoring gas furnaces were re-introduced into the same works, where the results obtained up to the present time having been of a highly satisfactory character. The heat-restoring gas furnace is similar in arrangement to the ordinary balling or reheating furnace, and occupies about the same space. It differs only in the mode of generating the heat, and in having an apparatus, which is called a restorer, added, for returning the waste heat. In the ordinary furnace, the coke, or solid part of the coal, is completely burned on the grate, and, in consequence, the combustion of the gaseous part of the coal is prevented, and of course the heat due to the coal gas is lost. In the gas furnace, the solid part of the coal is converted into carbonic oxide gas, which is combustible, and, along with the coal gas, is burned with a further supply of air in the part of the furnace where the heat is wanted. By this process, the heat from the gas, as well as from the solid part of the coal, is obtained. The chamber where the coal is converted into gas, occupies the place of the fire and grate of the ordinary furnace, and it is much deeper, in order to insure that no carbonic acid gas can be allowed to escape amongst the combustible gases. This furnace may be used either with or without a grate. When a grate is used, it must be constructed so that it can be cleaned while the furnace is working. The bars are horizontal, supported on bearers nearly a third of the length of the bars from the ends. The bars are free at each end, with an open space above, through which ashes or clinker can be drawn; and the bars have room to slide along nearly a third of their length, and can be drawn out or replaced when wanted.

This arrangement has been found to answer very satisfactorily. The producer is wrought with close doors, which are cast thin, with fins projecting outwardly to keep them cool, after the manner of the Gill stove. Previously, the doors were lined with brick; but the arrangement afterwards adopted has been found to answer better. When the gas from the coal leaves the producer, carrying with it the heat generated there, it is supplied with air for its complete combustion previous to its entering the heating chamber of the furnace, when it produces an intense heat, sufficient, if required, for completely melting malleable iron, as has been proved by repeated experiments. The air for the partial combustion of the solid coal, and expelling the coal gas, is supplied cold, but that for burning the gases is heated to a very high temperature by the waste heat of the furnace. The air required for combustion is found in practice to be about twenty-five times the weight of the fuel. It becomes, therefore, a convenient vehicle for returning the heat which usually goes to waste. The more heat which can be imparted to the air supplied for combustion, the less coal is required to maintain a given temperature in the furnace. The apparatus employed for transferring the heat from the highly heated waste products, leaving a furnace to air entering a furnace for combustion, is called a heat restorer, and is based on a very elegant model, to which the attention of the patentee was first called in 1844, by the late Mr. CONDIE, whose success in overcoming the practical difficulties attending the introduction of the hot-blast are well known. This instrument consists of two tubes, one placed within the other—the inlet of the one tube adjoining the outlet of the other. The tubes are open at both ends. If hot water be poured in at one tube, and cold water in at the other, the hot water will run out cold, and the cold water will leave the instrument heated very nearly to the temperature of the water which was poured in hot. The waste heat is transferred to the air for combustion by the restorer in the same manner. The air is introduced at the point farthest from the furnace, and gets heated as it advances towards it, where the gases are hottest; and conversely, the hot waste gases, as they proceed towards the chimney, meet the air at its greatest heat first, and the temperature gets lower and lower as they proceed towards the chimney. By exposing great surface, and continuing the process, the heat can be effectually restored to the furnace by heating the air. There is only one regenerator or restorer employed in GORMAN'S furnace, and as there is no reversing of currents, no values are required for that purpose, and the heat of the furnace advances steadily from the lowest to the highest temperature, so that only culpable negligence on the part of the heater would burn the iron or steel, or prevent the material being heated. The restorer is a chamber placed under the ground line, into which is placed a number of fire-clay pipes, open at each end. A wall runs up at each end of the pipes, dividing the chamber into three compartments—one, large, in the centre, and one at each end of the pipes—into which they open, connecting the smaller side chambers. The flame, or waste heat from the furnace, passes downwards through the entire compartment, impigning on the outside of the tubes placed therein. The air of combustion enters the side space at the bottom, passes through the pipes to the other side, rising to a higher series of tubes, and recrossing till it arrives at the top of the chamber, the effect produced being an upward current of air meeting a downward current of heated gases, with only the thickness of clay tube—less than an inch—between them; the current of air inside preventing the destruction of the tube by the high temperature outside.

The only extra about this furnace, which has no counterpart in the common furnace is the restorer, which in practice has given no trouble. Iron does not burn nor waste in Gorman's furnace, as it does in the ordinary furnace. The effect of the highly oxidising flame of the ordinary furnace, in fraying the iron away into cinder, is very obvious from the rotten porous coating of the one; and the effect of the non-oxidising flame of the gas furnace is also clearly shown by the smooth solid surface of the other, although its highly crystalline fracture proves that it has been completely melted, and, consequently, has been at a far higher temperature than the burned iron from the ordinary furnace. The brickwork of the gas furnace also shows that the iron is not much oxidised, as the oxide of iron is far more destructive on the brickwork than the mere heat of the furnace, and the bricks are not cut away in a week or two, as in some parts of the ordinary furnace. The

patentee also holds the conviction that iron will improve by being heated in the gas furnace, as it is always surrounded by a non-oxidising flame; and as there is always a plenum of presure inside the furnace, there is no danger from the iron being cut away by draughts of cold air, and, consequently, no need for building solid coal in the charging door of the furnace.

The exact yield of the gas furnace, as compared with furnaces of the ordinary kind, has been ascertained by repeated experiments. At the Govan Iron Works, the following were the results obtained:—Five piles, each 470 lbs. = 2,350 lbs., were weighed for the purpose, and charged into the gas furnace. At the same time, the same number of piles of equal weight were charged into the ordinary furnace. The gas furnace produced, from 2,350 lbs. of iron charged, 2,247 lbs., rolled iron, the loss being only 103 lbs., or 4.38 per cent. of the iron cherged. The ordinary furnace produced, from 2,350 lbs. iron charged, 2,058 lbs. rolled iron, the loss being 292 lbs., or 12½ per cent. nearly. The yield on iron required to produce a ton of rolled iron is therefore:—

	TONS.	CWTS.	QRS.	LBS.
With the gas furnace.....	1	0	3	19
With the ordinary furnace.....	1	2	3	10
	0	1	3	19

So that in the gas furnace 1 cwt. 3 qrs. 19 lbs. is saved, or less iron is used in producing a ton of rolled iron than with the ordinary furnace.

The following are the results of more recent experiments made at the works of COLVILLE & GRAY:—

	CHARGE OF PUDDLED BAR.				FINISHED IRON AND CROPPINGS.				PUDDLED BAR PER TONS OF FINSH'D.			
	Tons.	cwt.	qr.	lb.	Tons.	cwt.	qr.	lb.	Tons.	cwt.	qr.	lb.
Old furnace ..	58	2	0	14	53	5	0	14	1	1	3	25
New furnace ..	55	10	2	14	52	10	3	14	1	1	0	17
								Saving				92·8 lbs.

It may be interesting to mention that Mr. GORMAN's patent gas furnace is being extensively adopted in the iron-works of the west of Scotland. Messrs. BINN & MCCORKINDALE, Mossend, are putting up a number; in fact they are admitting no other kind into their works. The Muirkirk Iron-works are about to have fourteen of the same furnaces erected. At the Mossend Works several are also being erected. COLVILLE & GRAY, Coatbridge, have seven in operation. There are three at Govan Works, and a fourth is in process of erection. The tin-plate works have two, and Messrs. SPENCER & Co. have built three others. Mr. GORMAN adapted his furnaces for the use of iron-ship builders, and there are now about twenty of the latter kind in operation; among the firms using them being Messrs. R. NAPIER & SONS; Messrs. STEVEN & Co., Luithouse; Messrs. HENDERSON & COLBURN, and Messrs. CONNELL & Co. The patentee claims that, whereas the best qualities of coal require to be used for the ordinary furnace, he can produce the same amount of heat, or at least sufficient heat for all ordinary purposes, with a less percentage of dross or coal refuse. A Greenock firm, who were accustomed to use 20 cwt. of splint coal in the ordinary furnace, where they now use only 10 cwt. of dross in the gas furnace, declare that with this proportion of fuel they can get heat enough for anything. It has been said that the puddlers objected to GORMAN's furnace, because it heats so much more rapidly than the ordinary kind that it gives them no time for a smoke. In a short prospectus issued by the patentee, he claims for his invention the following advantages: "An economy of nearly fifty per cent. in fuel; and as all the coal is converted into gas before being used, ordinary dross can be employed, which is found to give a much superior heat in the gas furnace to the best coal burned in the ordinary furnaces. Furnaces may have doors for working at both ends; and when one end only is required to be used, the whole heat may be carried to that end, so that long furnaces may be used for heating long or short work, as required, with the greatest economy. The air used for combustion is heated by the escaping gases, and a considerable amount of heat is thus restored to the furnace, which can consequently be worked to as high a temperature, and heat the iron as rapidly, as desired; for instance, angle iron, 5 in. × 3 in. × 36 ft. long, is easily heated all over its length in three minutes; the consumption of ordinary dross being seven to eight tons weekly, in a furnace 2½ ft. wide by 41 ft. long inside. The heat restorer and gas apparatus are applicable to all kinds of heating furnaces; and it may also be mentioned that, owing to the completeness of combustion, there is no smoke.—*Colliery Guardian.*

The Electric Light.

THERE is no doubt about the value of the electric light, if we had any way of making it without the necessity of putting together a complex battery of cups, or of driving a magneto electric machine by steam. Its actinic property has been incontestibly proved, and its power to penetrate the densest fog has been shown in light houses and on our steamers. Hence the desire to have its manufacture placed within easy reach. Wilde's ingenious and beautiful machine, as shown at the Paris Exhibition of 1867, requires the use of a steam engine for revolving it, and is therefore unavailable, excepting for large establishments or on board of steamships, where a donkey engine could furnish the power without additional cost. The French steamers are furnished with the most complete apparatus that we have thus far seen. The lantern in which the carbon points are placed is carried with the utmost precision by clock work, and the power of the light is greatly increased by the use of a Fresnel lens. The light cast by such a lamp could be distinctly seen for several miles, and by means of a telescope the names of vessels two miles away could be easily read. Experiments with the electric light have been tried by the Prussian army. They have succeeded in casting a beam of light upon the fortifications of the enemy, and of disclosing their movements far beyond the reach of their guns. The light can be thrown so far that it is necessary to use a telescope to follow in its path, and discover what it reveals

The value of this form of artificial light in the pothographic profession has led to numerous inquiries for a practical magneto-electric machine, and Mr. MOSES G. FARMER, of Boston, is said to have invented a thermo-electric pile is essentially made up of couples of different kind of metals, and the heat applied is usually that of a Bunsen burner. When the current from such a battery is made to pass around an electro-magnet the magnet can be made to support a hundred-weight. When passed through a small induction coil very tolerable sparks can be obtained, and other interesting experiments, can be performed with it. If the thermo pile can be contrived to carry the electric light it will prove to be one of the most important inventions of the day.—*Journal of Applied Chemistry.*

MINING SUMMARY.

Nevada.

EL DORADO SOUTH MINE.

The following communication appears in the Austin *Reveille*:

"Mr. Editor—Sir: I have been so often asked about this mine that I have concluded to give you for publication a partial report of the same, compiled in part from observations made by M. C. VINCENT, M. E., F. G. S., of London, England, in 1868, and myself of recent date. The claim is 1,000 feet lineal measurement in length, and covered by a patent from the United States Government to the present owners, making the title perfect. The property is owned by the following persons: W. F. LEON, 533½ feet, of which W. P. BUFORD has a small portion; ROBERT MULLEN, 233¼ feet; and C. F. SINGLETARY, 233¼ feet. The mining department is under the immediate supervision of Mr. ROBERT MULLEN. As the value and importance of a mineral property depends so much or entirely upon the quantity and quality of the supply of ore, a closely detailed description of the El Dorado South lode cannot prove otherwise than interesting and acceptable to all parties engaged in mining. The deposits occur in a rather highly disturbed district, with granite rocks close at hand on the west, and extends in a northerly and southerly direction, and on the east by slate and quartzite. The vein is a true fissure, and from the gangue and selvage it is similar in kind and character to the most celebrated silver mines in Mexico, Peru, and Europe. Excepting about two hundred and fifty feet at the southern extemity, the vein is plainly traceable throughout the entire property—in places by magnificent croppings, which rise three and four feet above the surface and contiguous lands. Such outcrops are of an unusually massive character, and consist of a white, rather compact camphory-looking quartz, richly-clouded with black and antimonial sulpurets of silver. Some of the most interesting and splendid specimens of surface silver ores are obtained from the exposed portions of the El Dorado South lode. Only a portion, however, of the vein-matter is in the solid condition represented by the prominent outcrops just described. In such solid portions of the ledge the silver most generally pervades the quartz in the form of sulphurets. Nearly the entire contents of the vein above water is in a more or less advanced state of cloridization. The lode varies from fifteen to forty feet in width. The productive portion of the vein, the pay stratum, also varies from nine to twenty-three feet. It is found at times permeating the entire vein; at other times in chloride strata above the solid ledge. The vein has been opened at four different places along the lode for 600 feet by incline shafts and cuts. Shaft No. 1, at the N. E. end, 132 feet deep; No. 2, at eighty feet south from first, 172 feet in depth; No. 3, the main incline or working shaft, 276 feet in depth, 220 feet south of No. 2; No. 4, at 300 feet from third, sixty feet deep, with cut off seventy-five feet; making 640 feet of shafting.

"At the depth of 240 feet in the main working shaft, at water line, a level is being run north in the solid ledge which is now in sixty feet, proving it to be over eleven feet in width, so far displaying one of the finest bodies of mineral ore ever discovered, and impregnating the whole vein with ore of the most valuable kinds: beautiful crystallizations, including native and metallic silver, a combination of silver and antimony, horn silver or chloride of silver, stromeyerite, sulphuret of silver and iron, stetefeldtite, and the carbonate of copper, etc., etc. Much of the best ore is associated with the oxide of copper and iron. In such cases the per centage of silver is very great, amounting at times to twenty-five and even thirty per cent. of the entire mass. A few assays of this body of ore have been made, varying from $53 to $1,866 per ton of 2,000 pounds.

"Recent reduction of ore from solid ledge in main shaft, at water level, yielded per ton as follows:

"At Belmont mill, 20 tons.....	$207	00	per ton.
At Mahattan mill, 2 "	860	63	"
" " 2 "	237	00	"
" " 63 "	220	56	"

"At the south workings an enormous mass of chloride ore, colored with sulphur, overrides the solid lode, which has worked at the mills in this place and Austin from $130 to $562 per ton. There are now on the different dump-piles 1,000 tons of first and second-class ore. That being taken out from the main shaft and added daily to the present large amount, proves the ore alone in sight above water line at least a quarter of a million of dollars. The improvements on this mine in the way of shafts, levels, houses, etc., have cost over $100,000, and nothing has been done but of a useful nature. At present a whim is being used for hoisting which is being replaced by steam hoisting works recently purchased. The engine has a capacity of thirty horse-power. This being a true fissure vein there can be no doubt but that it will continue to yield a like proportion of rich ore for many years after the workings are increased in depth. The policy pursued by the owners has been to prospect this famous lode and not seek for profit. Already over $130,000 has been the yield of ores reduced from this property, at an average of $175 per per ton. After the steam hoisting works get in motion, sinking on the ledge will be continued for permanent work, and at respectable distances reached in depth different levels will be run north and south the entire length of the claim. So soon as the mine is properly opened reduction works of sufficient capacity will be erected to work all classes of ore taken from the mine by the company.

Yours respectfully,
W. F. LEON,
Gen'l Agent El Dorado South S. M. Co.
Belmont, Nye Co., Nev., Sept. 20."

THE COMSTOCK MINES.

The Gold Hill *News*, Oct. 29, has the following review for the week ending that date: "Chollar-Potosi daily yields about 300 tons. The developed ore sections hold out well, and will for a long time to come. The recent extraordinary rise in the stock, however, was due more to speculation than to anything else. No new ore developments are made. Yellow Jacket daily yields 165 tons good grade ore, from the three lowest working levels. The ore-breasts all continue looking and yielding well. The drift north, at the 1,000-foot level, is not yet completed to its connection with the winze from the level above. It is estimated that it will take nearly or quite a week yet to complete the connection, when an active attack will be made upon the good body of ore known to exist at that point. The face of the drift is in quartz containing bunches of excellent ore. Some very rich black sulphuret specimens have come from there during the last few days. General JOHN B. WINTERS has resigned the superintendency of this mine, which he has so long and efficiently held, his resignation to take effect a week from next Monday, Captain TAYLOR taking his place as superintendent. The Daney Company are about to resume operations in their mine in good earnest. They have put their machinery in operation, and will at once begin the work of sinking their engine sharft for a new level. Once the shaft is down to a proper depth, they will drift for their vein at a point where there are known to be large deposits of rich ore. We have no doubt but the Dancy mine contains large quantities of excellent milling ore, which can be cheaply extracted, if the mine is properly opened. Owing to financial embarrassments the Occidental mine is closed at present. The rescinding of that assessment does not seem to have produced a very desirable effect. Had it been duly collected, there would have been money to get along with until the ore from the mine could free it from debt, but now attachments are upon it, and it has fallen into undeservedly ill-repute. The stock was quoted at two bits a share yesterday. Gould & Curry yields, daily, eighty-five tons of very good ore, car samples assaying $44 per ton. A vast amount of prospecting drifts are run in all directions in search of ore. A seam of very fair ore was cut a few days ago in the United States section, at the sixth floor, above the car-track level. It promises to develop into a good-sized body. New and promising indications are also found in the lowest level. The Crown Point incline is now down nearly or quite 100 feet below the 1,100-foot level, and, the bottom still only shows barren quartz. The drift south at the 1,100-foot level is in 160 feet from the main east drift, and the face continues in barren quartz and porphyry. Daily yield of the upper mine eighty tons, fair grade ore. Hale & Norcross daily yield 150 tons, mostly from the seventh level, the ore breasts in which are still looking exceedingly well, both north and south of the shaft. The opening and development of the eighth level is being energetically done, and rich developments of ore may be looked for shortly. The Savage daily yield is eighty tons, principally from the eighth level. The Potosi section yields well yet, and a few tons come from the seventh level. The work of opening and developing the new lowest or ninth level is being carried energetically forward at a satisfactory rate. At the Ophir there have been no new ore developments. A raise is commenced, or is about being commenced from the south drift at the 700-foot level, which is expected to cut into ore extending from the level above. This, perhaps, is what induces the present slight rise in the stock. Prospecting is vigorously prosecuted at various points at the Belcher, with no new developments since our last report, except that the face of the main drift at the 420-foot level, and the raise above it, show more quartz; and the ore above the 200-foot level shows improvement. The Piute and Sapphire mills are kept steadily running on ore from the 200 and 300-levels of the Caledonia mine. The latter level gives the best yield, and shows continued improvement. Overman daily yields fifty-five tons, principally from the Lambert and lower tunnels, with a contribution of seven or eight tons from the raise above the 400-foot level. No new developments of ore. The Virginia Consolidated main west drift is in 695 feet from the shaft, at the 500-foot level. Rock rather harder, so not quite so good progress is made just at present. No water to interfere. Sacramento & Meredith is turning out plenty of excellent paying ore from the upper workings, keeping the mill steadily running. No new developments. Only quartz and porphyry developed as yet at the Imperial-Empire in the new 1,300-foot level, just opened. Nothing new in other parts of this mine. The excellent mine, Hope, continues its daily yield of forty-five tons of $26-ore, keeping both mills of the company steadily running. Sierra Nevada furnishes nothing new. Both mill and mine running satisfactorily, as usual.

Pennsylvania.

ASPECT OF THE WYOMING COAL FIELD.

Scranton is a wonderful place to have sprung up in so short a time, says the *Miner's Journal*. Within a circuit of two miles, which embraces Hyde Park, Providence, and several other places, they have a population of about 34,000, where thirty years ago there were only a few farm-houses. The principal street in Scranton has quite a metropolitan appearance, and would not disgrace any of our large cities. By a wise provision in selling the lots on this street, it was stipulated that no frame structures should be erected, hence all the buildings are of brick, stone, and iron, and all is life, activity, and enterprise, in fact, it is a miniature city of New York. The Wyoming Basin is very prosperous at present. The product from this valley has increased this year upwards of 2,000,000 tons over last year so far, owing to the "unpleasantness" that prevailed in Schuylkill County, and they are still increasing. The wages for laborers here are higher than those paid in Schuylkill County, even on a $3 basis, while miners make about the same as they would in Schuylkill County on a $3 basis. In this Basin the difference between the wages of laborers and miners are not so great as in Schuylkill County. The wages for good laborers outside are $2 a day, and range from $2 25 to $2 75 per day inside, according to occupation. Miners frequently pay laborers $3 a day, taken into breasts to cut coal after they have acquired experience as miners in cutting coal. The companies keep up the wages while they ignore the basis system—and the effect is, that individual operators are forced to pay about the same wages. The corporations are determined that their hands shall not stop even if they have to pay higher wages, which they can do, as they own the lines of transportation, and, when they do not, arrangements are made to carry coal cheaper for the companies than for individuals, based on larger tonnage. The result must be, that individuals will be driven out of the market, and they must either sell their collieries to the companies or sell their coal to them at the colliery. This will be the inevitable result. The companies are in the ascendancy, and in less than five years they will control all the collieries in that region, and labor also.

All the collieries from Pittston up to Carbondale are owned by the Delaware and Hudson Canal Company, the Delaware, Lackawanna, and Western, and the Pennsylvania Coal Company, except a few by individuals who sell their coal to the companies at the colliery. Those of the Pennsylvania Coal Company are all located round Pittston, except two at Dunmore, a short distance above

Scranton. The Delaware and Hudson Canal Company, and the Delaware, Lackawanna and Western, are rapidly extending their operations below and around Wilkesbarre, and the Lehigh Valley and Lehigh Navigation Companies are also rapidly gobbling up the others to secure tonnage to their roads. The few individual operators grumble and growl at the surroundings, but state that when they cannot send their own productions to market, they can sell their collieries to the companies, or sell their coal to them, and will get rid of the trouble of entering the market, even if their profits are reduced. This is a very natural conclusion, for it is really all they can do under the circumstances.

The Delaware and Hudson Canal Company now own eight breakers in the upper end of the region, embracing three shafts, three slopes, and eight drifts, and eight in the lower end of the valley below Pittston, working in all sixteen breakers, with a large number of collieries that use these breakers.

The Delaware, Lackawanna and Western Coal Company own fourteen breakers in the Scranton District, and four below Pittston, making eighteen breakers, with a larger number of shafts, slopes, and drifts that use these breakers.

The Pennsylvania Coal Company own nine breakers in the Pittston District, and two at Dunmore, making eleven collieries, embracing ten shafts and five slopes.

The Lehigh Valley Railroad Company own three collieries in the Wilkesbarre Basin, and the Wilkesbarre Coal and Iron Company, with its eight collieries, it is said, are first cousins to this company.

These companies, therefore, already absorb fifty-nine of the eighty-three collieries in that Basin, leaving only twenty-four in the hands of other companies and individuals in the Wyoming and Carbondale Districts, while many of them are already controlled by the companies, and sell their coal to them. Twelve of the twenty-four are corporations with no lines of transportation, leaving only twelve collieries in the hands of individuals below the Scranton District. Above, we believe, all the individuals and other corporations sell their coal to the companies who have transportation.

Here is food for reflection. If the W. B. A. do not act prudently, and exact too much from the individual operators, all the Anthracite Regions in this State will be driven into the hands of corporations, and when they possess the power they will fix their own terms in spite of the men. The laws are already in existence for their incorporation in all the regions—they are only biding their time to secure control.

Wyoming.

THE GREAT WYOMING COAL BELT.

Our Western exchanges, says the *Iron Age*, continue to give favorable accounts of the immense undeveloped coal fields of Wyoming Territory, extending along the line of the Pacific Railroad for a distance of some three hundred miles. From their location and the excellent quality of the coal they contain, these fields possess a prospective importance only second to that of the great anthracite deposits of Central Pennsylvania. One vein has been opened and worked to some extent during the past season, and the product is found to compare favorably with that of any Western mine now in operation. Its general heating properties, its freedom from sulphur, and its resistance to the disintegrating influence of the atmosphere when exposed to the weather, at least place it in the foremost rank among Rocky Mountain coals. It is, indeedt claimed that it is a better article, ton for ton, than Lehigh coal for making steam, for domestic use, for locomotives and for gas manufacture, because it has less waste, ash and clinker, and burns more freely, with less trouble in kindling. It is claimed that it will make 10,000 feet of gas to the ton—Pittsburgh coal making about 8,500. The average consumption of the engines on the Pennsylvania Central is one ton to every forty miles, while on the Central Pacific, upon which the new coal is used for some five hundred miles west of Ogden, a ton of 2,000 pounds is found to run an engine an average of seventy-five miles. It was also tried some months ago by the Union Pacific Company, in one of their cupolas at Omaha, for smelting cast iron, and. found to answer the purpose better than anthracite—adding, it is said, to the fineness of grain and the toughness of the iron. The proportion of metal and coal were about the same as with anthracite, and the time required for the smelting process also about the same. In the hills north and east of these vast fields occur layers of clay, iron and stone, yielding about 30 per cent. of metallic iron, remarkable for the large amount of lime it contains; thus obviating the necessity of using other flux, and leaving the ore in an unusually porous and fusible condition by means of the expulsion of carbonic acid gas in such great quantities. A few miles further east, deposits of magnetic ore have been found, and on the Weber river, a few miles west, the same has been discovered in great quantities. The existence of unlimited quantities of coal and iron in such close proximity, promise to make this region the seat of a great iron manufacturing industry in future years. Its natural advantages, combined with the requisite transportation facilities furnished by the Pacific Railroad, are attracting the favorable notice of Western capitalists, and it is probable that extensive operations will be undertaken within the next few years for the development of its vast resources of coal and iron.

Idaho.

The Owyhee *Avalanche*, Oct. 22, has the following. It says: It really looks good to observe the signs of activity that are now being manifested at the Oro Fino. The engine has been thoroughly overhauled, and the buildings are being comfortably fitted up for winter. The cluster of old log houses on the upper side of the road have been torn down in order to make room for a quartz yard. As soon as the mine is cleared of water, a force of men will commence taking out ore. The miners will be allowed to board where they choose. W. D. WALBRIDGE is superintendent, and will bring to bear his long and varied mining experience in this camp. JAS. THOMAS, late night boss in the Chariot, is to be foreman. We regard the sound of the steam whistle at the Oro Fino as a decidedly important note in the scale of our camp's prosperity. The winze in the sixth level of the Golden Chariot, south of the shaft, is now down about thirty feet. Large quantities of rich ore continue to be taken from the stopes of the fifth level. 60 cents per foot is now paid for drilling. The new hoisting works were at Elke ten days ago, and are probably half-way here by this time. Chariot stock was selling in San Francisco, last Saturday at $44 per share. The BRUCE Bros. are still at work on the Crane & Driggs', and are taking ore both from the surface and levels below. The last lot, worked at the Cosmos mill, yielded $58 per ton. Last Wednesday the Wild Dutchman tunnel was in 56 feet, having been run that distance in six days by six men. They have about 30 tons of ore, which is now being hauled to the Cosmos mill. The PHEBEY Bros. have four men at work on the Chariot dump, and have a large pile of fine-looking ore as the result of their labor. We are informed that last Tuesday one pan of decomposed quartz from the Belle Peck mine yielded $75 in gold. CHARLEY BROWN is having a few tons of ore worked at the Cosmos mill.

Michigan.

THE IRON MINES—ANOTHER NEW MINE.

The Marquette *Mining Journal*, October 29, says: Captain ED. BREITUNG has leased about a hundred acres of land belonging to C. T. HARVEY, just east of the Pendill farm, and which is crossed by the Pendill vein, and will at once proceed to open a mine. We hear it said that he has upon the land a large deposit of hematite, which can be very easily and economically worked. The opening of these two new mines, and of a third, of which we are not now at liberty to speak, will give a new impetus to the business in Negaunee. We hope so.

PENDILL MINE.

This new mine, in the hill just south of Negaunee, is turning out even better than anticipated. Captain MCCUMBER has already shipped over a thousand tons, and informs us that he will mine this fall about 5,000 tons more. He is now filling an order for 1,000 tons which goes to Cleveland *via* Escanaba. The ore has been tested in our home furnaces, and has been pronounced equal to the best hematite in the district. McC. has struck a rich lead, and we are glad of it.—*Marquette Mining Journal.*

The following is a comparative statement of shipments, in net tons, over the M. and O. R. R. to Marquette, for the years 1869-70, up to the 22d day of October:

Mine	1870. Tons.	1869. Tons.	Increase.
Lake Superior	152,139	116,814	35,325
Cleveland	49,565	37,437	12,127
Washington	68,823	45,419	23,404
Edwards	24,538	20,950	3,588
New England	26,203	11,735	14,450
Champion	62,035	16,489	45,546
Marquette	3,166	2,795	371
To local furnaces	52,599	21,800	30,799
Total	439,068	272,458	105,610

Shipments yet to be made to lower lake ports and to local furnaces will increase the ore business of the road to something over half a million tons.

The following is a comparative table showing the shipments of ore from the ports of Marquette and Escanaba, for the season, up to the 26th day of October:

IRON ORE

	Gross tons.	Net tons.
From Escanaba	358,242	401,220
From Marquette	350,098	392,110
Total ore	708,340	793,380
PIG IRON.		
From Escanaba (to Oct. 1)	5,557	6,224
From Marquette "	20,676	23,157
Total pig iron	26,233	29,381
Total ore and pig iron	734,573	822,711

Showing a difference of 7,823 net tons in favor of Marquette.

CLEVELAND.—Shipments up to and including the 26th day of October are given as follows:

	Gross tons.
From Escanaba	78,416
From Marquette	47,801
Total	126,217

Equal to 141,363 net tons, against a total product of 125,325 tons in 1869.

The following is a comparative table, in gross and net tons, of the amount of iron ore carried over our two railways, up to the 26th instant:

	Gross tons.	Net tons.
Over M. and O. K. R.	392,029	439,068
Over C. and N. W. R.	358,243	401,229
Total	750,265	840,288

Showing a difference of 37,848 net tons in favor of the M. and O. R. R. It is proper to add, however, that in the above table the shipments over the Pen. Div. C. and N. W. R. are given up to the 26th instant, while it includes amount carried over M. and O. R. R. up to the 22d only.

Montana.

QUARTZ MINING AT HELENA.

The Helena *Herald*, Oct. 17, says:—"The quartz mining interests in the vicinity of Helena are progressing with more than usual energy. All the mines of the great Whitlatch Union lode are being worked, and all the mills are running. On Big Indian Gulch the Gold Hill vein is being worked by the PARKINSON BROS. & Co.; and the old mill on Clark's Creek, so long silent, is successfully crushing the rock from the same. A great deal of work is being done on different lodes in the immediate vicinity of Helena, and a growing interest in quartz operations is plainly visible. At Radersburg the operations in quartz are meeting with the greatest success, and it will soon be one of the most advanced and best developed quartz camps in the Territory. The mines at Highland and Moose Creek were never looking better, and at Argenta, WASH STAPLETON and others are finding a profitable solution to the question of silver smelting. At Flint Creek, COLE SAUNDERS and others are grappling with the same question; and, in the vicinity of Virginia City and the old Hot Springs district, more activity than ever before is manifested in this direction. At Lower Silver Star the Green Campbell lode, under the superintendence of Mr. CHAS. D. EVERETT, is doing finely. The mill has been running steadily, and returning fine clean-ups. Half a dozen parties at the same place are working their leads by means of arastras, and are doing well; while at Upper Silver Star the Iron Rod maintains its old reputation, and is being remuneratively worked.

Nebraska.

THE OMAHA REDUCTION WORKS—INTERESTING PARTICULARS.

The Omaha *Republican* of the 18th ult., contains the following, important to all our miners: The stock company, for the erection of reduction works in this city, comprises the following gentlemen: Capt. C. H. DOWNS, W. H. PIER, of the firm of PIER & RICHARDS, Gen. W. W. LOWE, L. BALBACH, of Newark, N. J., C. W. MEAD, assistant general superintendent Union Pacific railway, and Messrs. JOHN HORBACH and DIFFENBACH, the latter gentleman of Newark, N. J. The company organized last Saturday, with the election of the following officers: President, Capt. C. H. DOWNS; Vice-President, Mr. PIER; Treasurer, Gen. W. W. LOWE; Secretary, A. L. KING; Directors, C. W. MEAD, Gen. LOWE, Capt. DOWNS, A. L. KING and W. H. PIER. The capital stock of $60,000 has all been paid up. The above amount is all that is required at present. Others of our citizens have manifested their earnest desire to take stock in the enterprise, which promises so largely both to the city and those directly concerned. Mr. BALBACH assures us that the work of erection will be pushed forward so rapidly that the works will be running by the first of January. The preparing of the ground at the foot of Capitol avenue, will be commenced to-day. These facts will be received with the utmost satisfaction by every citizen of Omaha. There are but two reduction works in the country, one at Newark, New Jersey, and the other in San Francisco. And in Omaha will be the third, half-way between the other two, and it will doubtless be the largest of the three within a year. In that time Mr. BALBACH says he will employ one hundred hands.

California.

IMPORTANT MINING DECISION.

The suit held against the Union Mining Company and others has been finally decided by the Supreme Court of California. The plaintiff recovers two-thirteenths of the mine and also judgment for $124,598, which sum represents his share of the net proceeds of the mine appropriated by the defendants, implying that the total net proceeds were more than $800,000. As to the rule by which this sum was ascertained, we have no information. Mr. REED, the discoverer, or one of the discoverers of the mine, put the names of his wife and daughter in the list of the owners of the mine posted up on the claim, but this list was soon afterwards taken down by the majority of the owners of the mine, and another list was submitted, omitting those two names, and from that time forward they were treated by those in possession as if they had no interest in the mine. The daughter brought suit to recover, and at last, after six or seven years of litigation, it is decided. The court holds that when a title to a mining claim has been vested in a person under the mining custom, it cannot be taken away, except by due process of law. The daughter in this case was a minor at the time, had no part in the discovery, contributed nothing to its expense, and knew nothing of the insertion of her name in the notice at that time. Yet it was done, those who put it there could not take it away, any more than after recording a deed, giving certain real estate to a child, they could take it back.—*California Alpine Miner.*

New Mexico.

The Cimmaron *News* gives the following summary of mining news in that locality:—"Aztec mines, for eight days, ending September 25, 1870, produced 29 ounces of gold. POLLOCK's claim, Grouse gulch, Moreno mines, 7 days, 24 hours per day, 18 men employed, 100 inches of water, produced 55 ounces of gold. Result of last run of New Orleans Company, on New Orleans Flat, in the Moreno mines: Number of days worked, 7; number of hours worked per day, 4½; number of men employed, 4; number of inches of water used, 21; gold produced, 25 oz. 6 dwt. Result of last run of Last Chance claim, belonging to the Maxwell Land Grant and Railway Company, in Moreno mines; number of days worked, 9; number of hours worked per day, 4; number of men employed, 2; number of inches of water used, 25; gold produced, 12 oz. 8 dwt.

New York.

HELL GATE OBSTRUCTIONS.

The injunction sued out by parties who claim to have been damaged by the blasting operations at Hallet's Point, was lately removed, and the work, says the *Iron Age*, has been renewed with increased energy. The locality is on the Astoria side, but a very short distance from the ferry. Access is not granted to visitors without a permit from Gen. NEWTON, the controlling engineer. Col. RIGHTMEYER, the superintending engineer, has about eight Cornish miners, beside others, at work drilling, blasting and removing the excavated rocky debris. At first, a great deal of trouble was experienced with the laborers, who were obliged to work in the dark, damp chambers, with the cold water trickling through the rocks on all sides, and completely saturating their garments. Either rheumatism or natural disgust induced them generally to leave after a few days' trial. A remedy was found in the substitution of Cornish miners, whose experience in the mines of Pennsylvania and the Lake Superior districts, as well as in Great Britain, renders them invaluable. They are a brawny, tough, intelligent class of young men, inured to the damp, chill atmosphere, and skilled in the work. They greatly economise time and powder by knowing how to drill through the strata and place the blasts where they will do the most execution. There are three sets of men, who work eight hours each. Operations are continued unremittingly, night and day. Eight "galleries," or chambers, have been commenced. These run in various directions—under the reef—all converging to a common centre at the point of beginning. They are named after prominent distinguished men. Those furthest advanced are "Grant," "Sherman," "Humphries." They all front the great excavation, which is sixty by one hundred feet in size, and thirty feet by the mean, low water mark, to the floor line. "Grant" gallery has been pierced to a distance of thirty-two feet directly under the most formidable spur of the reef. These tunnels are to be extended a distance of 200 feet, and are from eight to ten feet in diameter. The rock is very hard—mostly of gneiss. The blasting charges are of one-quarter, one-half, one and two pounds respectively, contained in pasteboard tubes well wrapped in glazed gutta-percha cloth, tarred at the ends, with safety-fuse, all water-proof. Thirty or forty of these are discharged nearly at the same time, a gong being previously sounded to draw off the workmen. Huge logs, interlaced with iron bands, forming "curtains," are hung at the opening of each tunneling to prevent the detached rock from being hurled into the air without. The force is so terrible, however, that these ponderous curtains are often swung out eight or ten feet. Great steam derricks elevate the refuse, and steam pumps lift out the water. Daily observations are taken to guide the work. A miniature levee keeps off the water on the river side. A temporary platform extends out over the reef, from which a fine view of the wild, rushing tides is afforded. Even when but about a depth of two feet of water is flowing over the "hog's back," its force is so great as to sweep a strong man instantly off his feet. This gigantic enterprise must proceed very slowly, and require years for its successful consummation.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

MARKET REVIEW.

The Coal Trade.

NEW YORK, Nov. 11, 1870.

The trade remains unusually dull for this season of the year. Immediately after the last Scranton sale—at the schedule of prices—there was quite an active demand for coal, but the weather continuing extremely mild, and the regions all actively pushing forward tonnage for the current month, we find this week as a result a much less active inquiry for Coal, and it is selling slowly even at the present extremely low figures. The Schuylkill region practically *ceases* operations with the close of the current month—as the navigation becomes interrupted early in December—and the market receives its winter supplies from the Lehigh, Wilkesbarre, and Lackawanna regions. Should the winter set in early and prove a severe one, we may resonably look for an advance in prices, but if it should be a mild winter, prices will show but little variation from the current quotations. We find the Lehigh and Wilkesbarre coals are moving off pretty freely at the monthly circular rates; whilst on Schuylkill coal prices are as irregular as the quality of coal produced in that region, to wit.: good, bad, and indifferent. From the figures we hear at which sales have been made of "cargoes afloat," we should think the November business of Schuylkill operators would show very disastrous results.

AT RETAIL.—Dealers are generally doing a fair business. We quote prices at retail: $7 50 for best Red Ash, $7 for Locust Mountain and Lehigh, and $6 to $6 50 for Lackawanna coals.

FREIGHTS.—Vessels are in moderate supply, and rates of freight steady at our quotations.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Nov. 5, 1870, compared with week ending Nov. 6, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R	106,469	2,490,924	87,912	2,663,160
Schuylkill Canal	19,841	509,130	31,418	416,943
Lehigh Valley R. R.	43,058	1,824,027	47,671	2,622,022
Lehigh & Sus. R. R.	3,391	705,729	2,053	889,561
Lehigh Canal	....	583,284	25,430	677,771
Scranton North	16,611	359,310	11,412	6,5,744
" South	20,764	387,778	42,079	1,513,279
Penn. Coal Co., rail	17,690	821,191	21,482	984,133
" " " canal	951	16,729	243	15,161
Del. & Hud. Canal Co.	52,672	1,306,779	41,493	1,213,633
" " R. R.	6,776	122,265	16,751	429,770
" " south	6,790	104,238	10,513	390,830
Shamokin	11,598	267,196	12,930	415,949
Trevorton	1,763	28,623	....	67,371
Lykens Valley Coal Co.	2,995	15,609	5,143	136,766
Wyoming South	....	273,825	....	284,339
Wyoming North	4,661	62,750	....	....
P. N. Y. C. & R. R. Co.	....	....	5,149	257,861
Williamstown, Co'y	6,509	109,036	7,105	256,183
Short Mountain	2,952	93,037	....	....
Big Lick Colliery	....	....	....	....
Total	328,149	10,992,693	366,784	13,849,909
1869	....	....	338,140	10,992,93
Increase week and year	....	....	28,644	2,856,316

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Nov. 5, 1870, compared with week ending Nov. 6, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	20 000	847,000	25,951	864,642
C. & O. Canal	15 000	536,000	19,584	530,046
H. & B. T. R. R.	7,945	305,092	....	256,737
Harrisburg & D.	14,412	....	14,429	658,720
L. V. R. R.	....	11,883	....	12,213
P. & N.Y. C. & R. Co.	....	....	5,232	223,220
	57,357	1,699,885	65,296	2,545,578

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, Nov. 3, 1870:

From St. Clair	29,808 12
" Port Carbon	6,665 01
" Pottsville	4,642 10
" Schuylkill Haven	25,764 04
" Auburn	5,797 05
" Port Clinton	14,763 14
" Allentown and Albartis	471 03
" Harrisburgh and Dauphin	14,429 13
Total paying freight	102,342 02
Coal for Company's use	4,002 17
Total for week	106,344 19
Previously this year	3,261,209 10
Total	3,367,554 09
To same time last year	3,750,635 17

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, November 3, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	30,253 05
" Port Clinton	1,165 00
Total for week	31,418 05
Previously this year	385,525 00
Total	416,943 05
To same time last year	569,130 00

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via. the Pennsylvania and New York Canal and Railroad Company, for week ending Nov. 5, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	5,149 13	252,412 03	257,561 16
Bituminous	5,232 00	217,998 00	223,230 00
Total, Ant. and Bit.	10,381 13	470,410 03	480,791 16

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, November 5, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	11,412 07	625,744 11
Shipped South	42,079 16	1,513,279 13
Total	53,492 03	2,139,024 04
For the corresponding time last year.		
Shipped North	16,671 02	356,310 14
Shipped South	26,743 18	857,879 17
Total	44,354 12	1,214,190 11
Increase	1,137 11	924,833 13
Decrease		

Lykens Valley Coal Trade.

Shipment of Coal for the week ending Nov. 5, 1870.

For week	5,143 06
Same time last year	2,895 07
Increase	2,247 19
For year	136,766 04
Same time last year	65,009 10
Increase	71,156 14

Report of Coal Transported over Lehigh Valley Railroad

For the week ending November 5, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	11,272 09	536,711 02	547,983 11
" Hazleton	35,464 14	1,832,571 07	1,868,036 01
" Upper Lehigh	169 19	11,627 03	11,797 02
" Beaver Meadow	12,175 04	647,781 19	659,957 03
" Mahanoy	7,386 11	252,855 06	260,241 17
" Mauch Chunk	130 17	1,387 07	1,518 04
Total Anthracite	66,599 14	3,282,934 04	3,349,543 18
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		12,213 00	12,213 00
P. & N. Y. C. & R.R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	66,599 14	3,295,147 04	3,361,746 18
Same time last year	45,946 19	2,058,299 06	2,115,577 02
Increase	20,652 15	1,236,847 18	1,246,169 16
Decrease			
Forwarded East from M'h Chunk by rail	47,671 11	2,574,351 06	2,622,022 17
Same time last year	43,058 03	1,780,969 16	1,824,027 19
Increase	4,613 08	793,381 10	797,994 18
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	47,671 11	2,574,351 06	2,622,022 17
To N. C. R. R., at Mount Carmel	39 09	3,384 06	3,423 15
Forwarded North from L. & B. Junction	5,149 13	251,885 17	257,035 10
To L. & S. R. R. at Packerton for rail	221 16	7,467 09	7,689 05
Delivered at M'h Chunk	91 08	1,273 11	1,364 19
Delivered on line of road above Mauch Chunk	372 06	9,431 18	9,804 03
Delivered above M. Chunk for use of L. V. R.R.	1,372 03	46,927 00	48,299 03
To L. & S. R.R., at P'n Hav., for railroad			
Do. for canal	7,904 00	261,253 05	268,457 05
At M. Chunk for canal	4,474 09	126,962 12	131,437 01
Total Anthracite	66,599 14	3,2-2,934 04	3,349,533 18
Bituminous Coal		12,213 00	12,213 00
Total all kinds	66,599 14	3,285,147 04	3,361,746 18

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending November 5, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	25497 18	19825 02	1753284 09	683696 16
Upper Lehigh Region	2231 11		128945 04	57,286 03
Mahanoy Region	96 10		7211 15	2511 01
Hazleton Region	3390 12	84 01	277561 01	72,735 18
Beaver Meadow Region	4377 15		1506 2 18	9838 11
Mauch Chunk Region	11504 00	12160 08	180710 14	362402 03
Totals	51568 11	32069 11	1773406 01	1341053 12
Increase	19499 00		432352 09	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	20053 15	30391 19	886561 10	705759 06
Forwarded East of Mch Chunk by Canal	25430 08		677781 10	583284 04
Delivered at and above Mauch Chunk	1159 01	1045 02	38124 03	28389 10
Delivered to L. & B. R. R. at Plymouth Bridge	4925 07	632 10	170933 18	17469 09
L. V. R. R. at Sugar N.				5151 03
Totals	51568 11	32069 11	1773406 01	1341053 12
Of the above there was transported on acc'nt of L. C. & N. Co.	13858 03	13158 11	219102 04	389307 12
W.-B. C. & I. Co.	12415 01	9067 04	516162 10	3419 5 10
Totals	26273 04	22225 15	735264 14	731243 09
Increase	4057 09		4021 05	
Decrease				

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, November 5, 1870.

	WEEK.	SEASON.
North	47,303 12	1,758,494 05
South	10,513 16	390,830 09
Total	57,817 08	2,149,323 14
CORRESPONDING TIME IN 1869:		
North	45,218 06	1,110,712 03
South	6,789 15	100,521 09
Total	52,108 01	1,211,233 09
Increase North	1,985 06	Inc. 647,781 05
Increase South	3,723 01	Inc. 290,309 00
Total Decrease	5,709 07	Inc. 938,090 05

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending November 5, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal	41,493 00	1,213,633 00
By Railroad	16,751 00	429,770 00
South	10,513 00	390,830 09
Total	68,757 00	2,034,233 00
Corresponding time in 1869.		
By Del. and Hud. Canal	52,672 00	10,05779 00
By Railroad	6,776 00	128,295 00
South	6,790 00	10-,738 00
Total	66,238 00	1,236,312 00
Increase	797,921 00	

Summit Branch Railroad Company.

The following is the quantity of Coal shipped from Williamstown Colliery, for week ending Saturday, November 5, 1870 | 7,105 01
Same time last year | 6,509 12
Increase, Tons | 595 09
Total amount shipped to date | 223,183 16
Same time last year | 103,036 00
Increase, Tons | 90,147 16

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Nov. 5, 1870.

	1870. WEEK.	1870. YEAR.	1869. WEEK.	1869. YEAR.
By Railway	21,482 18	984,163 09	17,050 02	821,191 05
" Canal	243 01	15,061 14	951 01	16,799 07
Total	21,725 19	999 225 03	18,041 03	837,990 12
Increase, 1870, 161,234 11 tons.				

Shipments of Cumberland Coal

for the week ending Saturday, November 5, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M	.....	.....	.....
Borden	2,686 12	2,393 19	5,062 11
Consolidation	5,921 13	5,594 11	11 516 04
Spruce Hill	720 19	.....	720 19
Midlothian	93 01	694 13	737 14
H. and Baltimore	48 10	1,616 14	1,665 13
do Va M	1,108 10	.....	1,108 10
V C & I Co	797 10	.....	779 17
G. C. C. and I	320 15	.....	820 15
Big Vein	1,210 10	.....	1,210 14
Maryland	1,957 00	5,189 14	7,146 15
American	1 407 10	4,095 05	5,502 15
Atlantic	1 300 07	.....	1,300 07
Piedmont	1,901 15	.....	1,901 15
Swanton	1 168 10	.....	1,168 14
Barton	914 00	.....	914 00
Potomac	1,685 00	.....	1,685 05
George's Creek M. C.	625 01	.....	625 01
Franklin	1 528 12	.....	1,528 12
Total week	25,951 00	19,584 16	45,555 13
Previous	838,691 12	519,462 00	1,349,153 13
Total year	864,642 14	530,046 10	1,394,689 11

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Oct. 27, 1870:

	Tons.
For week	14,429 13
Previously this year	629,847 18
Total	644,339 02
Same week last year	12,552 14

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, November 5. R. A.	W. A.	AT PHILADELPHIA, November 4. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 50 to 6 00	5 25 to 5 50	— —	4 50 to 4 75
Stove	5 50 to 6 00	5 50 5 75	— —	4 50 to 4 75
Chestnut	4 00 to 4 50	4 00 4 25	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 60	— —	— —	— —
Broken	5 35	— —	— —	— —
Egg	5 35	— —	— —	— —
Stove	5 85	— —	— —	— —
Chestnut	4 60	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 00	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	5 75	— —	— —
Honey Brook, Leh'h	W. A.	4 25 to 5 25	— —	— —
Spring Mountain	"	4 25 to 5 25	— —	— —
Sugar Creek	"	4 25 to 5 25	— —	— —
Sugar Loaf	"	4 25 to 5 25	— —	— —
Old Comp'y's	"	4 25 to 5 25	— —	— —
Cross Creek	"	4 25 to 5 25	— —	— —
Room Run	"	— —	— —	— —
Girardville	"	— —	— —	4 75
McMichael	"	— —	— —	4 75
Shamokin	"	5 50	5 25	— —
Lykens Valley	"	— —	5 75	— —
Broad Top	"	5 50	— —	— —
Hill & Harris	"	— —	4 75	— —
Henry Clay	"	— —	5 00	— —
Powelton	"	5 50	— —	4 75

(*Dealers in these coals may be found in our advertising columns.)

Prices for Coal at Mauch Chunk.

November 1870.

	F. L.	Bro.	Gra.	Eg.	Sto.	Chest.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein...f.o.b. at Phila.	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	4 75
Consolidation Coal Co.'s on board N. Y.	7 00
Maryland Coal Co. "	7 00

Company Coals.

November, 1870.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 25	4 50	4 50	5 25	4 25
Pittston at Newburgh	4 30	4 30	4 50	4 60	4 90	4 20
Lackawanna at Rondout	4 25	4 25	4 45	4 60	5 10	4 30
Wilk'b're at Hoboken	4 00	4 25	4 50	4 65	5 25	4 10
Old Co. Lehigh at Pt. Johnston	5 25	5 00	5 00	5 50	4 25	— —
Lehigh at E. Port	5 25	— —	5 00	5 00	5 50	4 25

For freights to different points, see "Freights."

Prices at Baltimore—November, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 80@— —
Pittston and Plymouth, do	5 65@5 75
Shamokin Red or White Ash, do	— —@6 00
Lykens Valley Red Ash, do	6 25@— —
Zerba Valley	5 25@— —
Trevorton	6 00@— —
By retail, all kinds per ton of 2240 lbs	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg gas, f. o. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

November, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

November, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

Duty, $1 25, gold.

	Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co	$7 50 @— —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	8 00 @— —

AT PHILADELPHIA.

Powelton.....$7 80

Prices of Foreign Coals.

November, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 00@— —
" Cannel	11 50@12 50
" House "	— —@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 75½
C. R. R., N. J., Easton to Elizabethport	1 08
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 18

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 75
C. R. R., of N. J., Easton to Pt. Johnson	1 11
Shipping expenses	25
Warfage	10
Total	$2 22

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 75
Morris & Essex R. R. Easton to Hoboken	1 11
Shipping expenses	25
Warfage	10
Total	$2 22

TO SOUTH AMBOY.

L. V. R. R.	75
B. & D. R. R.	
Cam. & Am. R. R.	1 02
Shipping Expenses	25
Total	$2 02

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	75
C. RR. of N. J. Easton to Elizabethport	1 08
Shipping expenses	25
Wharfage	10
Total	$2 1

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven.....$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORE.

Lehigh Canal	$ 40
Morris "	2 10
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 05
Freight	
	2 45
For re-shipment	2 19

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1 00
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40

	Per Boat.
Greenwich	$70 00
Port Chester	60 00
Mamaroneck	70 00
Glen Cove	60 00
New Rochelle	55 00
East Chester	60 00
West Chester	50 00
White Stone	50 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	15 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS

Boats of 150—250 Tons.	Per Ton.
To Manhattanville	8 cents
Spuyten Duyvil	8 "
Yonkers	9 "
Hastings	10 "
Piermont	17 "
Dobbs' Ferry	12 "
Nyack	14 "
Tarrytown	15 "
Sing Sing	16 "
Croton Landing	17 "
Haverstraw	17 "
Verplanck's	17 "
Peekskill	18 "
West Point	20 "
Cold Spring	20 "
Newburgh	18 "
Poughkeepsie	22 "
Rondout	23 "

Boats of 100 Tons	Per Boat
To Manhattanville, and Return	$11 00
Spuyten Duyvil	13 00
Yonkers	15 00
Sing Sing	20 00
Peekskill	25 00

Freights.—NOVEMBER, 1870

TO EASTERN PORTS.	From Philad'a.	From E. Port and Port Johnson.	From Newbury...	From Rondout....
Amesbury	$2 50	$2 00	@	@
Bangor	2 30	1 60	1 60	
Bath	2 30	1 75	— —	
Boston	2 30	1 75	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 25	2 00		
Derby	2 00	1 20		
Dighton	2 30	— —	1 45	
East Cambridge	2 25	2 00		
Fall River	2 50	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 35	60		
Middletown	2 25	1 25		
Mystic	— —	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 50	1 85		
New Haven	1 90	1 00	1 10	1 20
New London	2 00	1 25	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 05	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 25	1 50		
Portsmouth, N. H.	2 25	1 85		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 50	1 30	
Salem	2 25	1 65	2 25	2 35
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	1 75		
Warren	— —	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	60	
Catskill		— —	50	
Cocksackie		— —	50	
Coeyman's		— —	75	
Cold Spring		— —	35	
Fishkill		— —	30	
Haverstraw		50	60	
Hudson		— —	50	
New York		— —	70	
Nyack		60	60	
Poughkeepsie		— —	35	
Rhinebeck		— —	30	
Rondout		— —	— —	
Sangerties		— —	40	
Sing Sing		— —	75	
Stuyvesant		— —	55	
Tarrytown		80	75	
Troy		90	75	
Verplanck's		— —	35	
Yonkers		40	60	

Foreign and Provincial Freights.

November, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-3 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s @16. ton
TO NEW YORK.	
Provincial	
Sidney	$3 00
Lingan	3 00
Cow Bay	—
Port Caledonia	3 25
Little Glace Bay	3 00
TO BOSTON.	
Sydney	$2 75
Lingan	2 75
Cow Bay	—
Port Caledonia	3 00
Little Glace Bay	2 75

METALS.

NEW YORK, November 10, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1¾ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1½ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	33 00@36 00
Pig, American, No. 1	— —@32 00
Pig, American, No. 2	— —@31 00
Pig, American, Forge	27 00@29 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00

	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₰ ct.	— —@110 00
Bar, Refined " "	80 —@ 85 00
Bar, Common " "	75 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅜ to 5-16inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ₰ ct.	— 7@— 7½
Sheet, Russia, as to Nos. (gold)	11 @—11½
Sheet, Single, D, and T. Common	—4¾@— 6
Sheet, Galv'd. Nos. 14 to 26 17 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ₰ ton	57 00 @59 00
Rails, American, at Works in Pa.	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₰ ₰ or under, 2½ cents; over 7 cents and not above 11, 3 centsore ₰ ; over 11 cents, 2½ cents ₰ ₰. and 10 ₰ cent ad val. (St prices.)

English Cast (2d and 1st quality) ₰ ₰	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 12
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5 ; old Copper 20cents ₰ ₰; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₰ ₰	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	— @— 19
Copper, Chili Pig	— @— —
Copper, American Ingot	22¼@— 22¾
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	34 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₰ 100 ₰s. ; old Lead, 1½ cents ₰ ₰: Pipe and Sheet, 2½ cents ₰ ₰.

Galena, ₰ 100 ₰s	$— @— —
Spanish (gold)	6 12½@6 30
German, do.	6 12½@6 30
English, do.	6 25 @6 62½
Bar (net)	7 50 @— —
Pipe (net)	7 50 @— —
Sheet	8 00 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₰ cent. ad val : Plate and Sheets and Terne Plates, 25 ₰ cent. ad val.

	Gold ₰ ₰.
Banca	— @31½
Straits	31¾@32
English	31⅞@32

PLATES.	Fair to Good Brands. Gold.	Currency.
I. C. Charcoal, ₰ box	$8 25 @8 87½	$9 75 @10 75
I. C. Coke	7 25 @8 —	8 50 @ 9 50
Coke Terne	6 65 @6 75	6 75 @ 7 75
Charcoal Terne	7 50 @8 —	9 00 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₰ 100lb

	Gold.
Plates, Foreign ₰ 100 ₰s.	$6 00 @ 6 12½
Plates, Domestic ₰ ₰.	7 1-15@- 11½

REMARKS.

IRON.—There is no change of moment in the market for Scotch Pig. The demand is quite active, but in the absence of supplies business is still confined to small parcels at prices favoring sellers. The sales are 50 tons Summerlee, a resale, at $34 50; and 300 do. Coltness, on private terms. We learn from the consignees that the sales of 750 tons Summerlee, reported in our last were made in lots at $30 gold and $33 @ $33 50 currency, and not as then reported. American remains inactive and nominal. New Rails meet with very little inquiry, but prices are unchanged. Old continue in active request, and we notice sales of 200 tons old T at $39 25 gold ; and 1,500 do. Double-headed, to arrive, on private terms.

Import from Jan. 1st to Oct. 31st, 1870.

	Bar. Tons.	Pig. Tons.	Sheet, etc. Bdls.
From foreign ports	14,143	40,037	196,183
Coastwise	20	125	1,608
Total	14,163	40,162	197,791
Same time 1869	12,512	48,257	298,718

LEAD.—There is little if any Foreign Pig in first first hands, and though the demand is moderate, prices remain firm. We have only to notice the sale of 25 tons Spanish at $6 35 gold, 30 days.

Import from Jan. 1st to Oct. 31st, 1870.

	Pigs.
From foreign ports	433,523
Coastwise ports	10,172
Total	443,695
Same time 1869	434,991

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. Ingot continues in fair request, and the recent advance is well sustained, the market still hardening. Sales have been made of about 200,000 lbs. Lake, on the spot, at 22¼ @ 23¾ cents ; and 4 @ 500,000 lbs. for November to February delivery, 22½ @ 22¾. Baltimore and Tennessee is scarce, and is worth as much as Lake.

TIN.—The market for Pig remains at a stand, and the prices are altogether nominal, say for Straits and English 31¾ @ 32 cents, and for Banca 35½ gold. Plates are also dull, and prices here and there soften a little. We have only to notice sales of 250 boxes 14 by 20 Coke Tin at $7 62½ ; 250 do., 10 by 14, $7 25 ; and 200 do. Charcoal Terne, $7 50, all gold.

Import, from Jan. 1 to Oct. 31—	1870	1869
Pigs ..... No.,	87,292	55,697
Plates ..... Bxs.,	737,232	872,990

SPELTER.—The market for Foreign remains very dull, and we hear of no sales ; 6 @ 6½ cents gold is the nominal price.

Import from Jan. 1 to Oct. 31—

1870.....Plates, 240,678 | 1869.....Plates, 325,535

ZINC—Is quet, and we have only to notice the sale of 75 casks Mossellmann Sheet at a private price.

Zinc, Sheet	10c. per lb.
Spelter, Foreign	10½c. "
" Domestic	11½c. "
Fine White, French	11c. "
" American	11c. "
Manganese, best	4½c. "

The Shamokin *Herald* says that Trevorton started up on the "independent" system. About half the collieries in Northumberland County are now working independently, and are all well supplied with miners.

We note a new Coal in our market, for gas-house and steam purposes. It is known as the Red Bank Cannell. It is from a new mine in Clarion County, Pa.

San Francisco Stock Market.

We have reports by telegraph from the San Francisco Stock Market, dated Nov. 10. Below is a comparative table, with the quotations for this and the week previous in full.

(By Telegraph.)

PER SHARE.	Nov. 3.	Nov. 10.
Savage	33⅛	27⅝
Yellow Jacket	37⅛	31¾
Kentuck	No sales	28½
Chollar Potosi	75	77½
Gould & Curry	90	76
Belcher	No sales	23½
Imperial	"	31½
Amador	241	No sales
Crown Point	—	—
Ophir	—	—
Alpha	—	—
Hale & Norcross	—	—
Empire Mill	—	—

Prices of Slate in New York.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, "	5 75@ 6 25
Pa. b'k and d'k blue, 1st qual., "	6 00@ 7 00

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending November 5, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	220	5,930	6.150
New York Slate Co	120	2,950	3,070
Middle Granville Slate Co	45	557	602
*American Slate Co	....	....	....
Benj. Williams	....	1 333	1,133
Jones & Williams	....	120	120
Eagle Slate Co	35	159	194
H. W. Hughes	....	210	210
J. D. Jones	....	35	35
Total	420	11,294	11,714

*Penrhyn and American Co.'s shipments are consolidated for this season.

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	.....	.....	.....
Penrhyn Slate Co	118	1,898	2,016

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co ..... cars		23	23
Penrhyn Slate Co ..... "			

Hydeville, Vt.

REPORT OF SLATE SHIPPED FROM HYDEVILLE, VT., VIA R. & S. RR., FOR THE WEEK ENDING NOVEMBER 5, AND FOR THE YEAR 1870.

ROOFING SLATE.

	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co ..... sqs.	70	745	815
Western Vermont Slate Co	..	26	26
Blue Slate Co	120	652	772
The Evergreen Slate Co	170	4640	4810
Forest Mining Slate Co	15	200	215
West Castleton Slate Co	..	90	90
E. D. Billings	..	263	263
R. M. Copeland	..	143	143
W. E. Williams	..	80	80
Forest Slate Co	..	80	80
Total	375	6913	7224

MILL STOCK.

E. A. Billings	43 ps.
Forest Mining Co	320 "

FINISHED MANTELS.

West Castleton Slate Co. box.	35	478	513
Forest Mining "	15	307	322
Total	50	787	835

BILLIARD BEDS AND BLACK BOARDS.

Eagle Slate Co ..... box.	..	..	152
West Castleton Slate Co	..	..	661
Western Vermont	..	..	31
Total	....	....	844

TILE.

Eagle Slate Co ..... cas.	123	1675	1798

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL :

For the weeks ending October 29 and Nov. 5, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.	Oct. 29.	Nov. 5
Jones & Williams ..... sqs.	175	280
Girard Slate Co	35	35
Lehigh Slate Co	70	35
Locke Slate Co	420	70
Kuntz & Woodring	105	35
H. Williams	..	35
J. Anthony	..	..
D. Thomas	..	..
Jones & Town	70	..
Philadelphia Slate Co	..	..
Saylor & Morgan	..	105
D. Williams & Co	35	105
Hope Slate Co	35	70
Heimbach	..	35
Total	1225	805

SCHOOL SLATES.

H. Kuntz ..... cases.	9	4
Lehigh Slate Co	11	14
A. W. Lerch	33	9
Locke Slate Co	11	31
Total	64	58

BLACK BOARDS.

Lehigh Slate Co	7	3
Yerkes & Martin	..	9

MANTELS.

Lehigh Slate Co	13	34
Yerkes & Martin	80	33
Total	93	67

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co ..... sqs.	35	175
T. Beck & Co	..	70
Heimbach Slate Co	70	35
Continental Slate Co	120	35
Mauch Chunk Slate Co	..	35
Welsh	44	44
T. J. Thomas	..	35
Total	269	429

LEHIGH CANAL.

ROOFING SLATE.

Heimbach Slate Co ..... car	350	1	
	Nov. 5.	Previously.	Total for Year
L. and S. R. R.	429	9,359	9.788
L. V. R. R.	205	20 822	21.02.
Lehigh Canal	..	3,712	3.71
Total	634	33,893	34,527

Burning Coal Mines.

NEAR Mauch Chunk, Pa., is a burning coal mine, which has been on fire for many years. At Brule, near St. Etienne, there is a coal mine which has been on fire from time immemorial. Other burning coal mines are cited in France ; for example, those of Deeazeville, Aveynon, and of Commentry, in the department of Alier. In the carboniferous basins of the Saarbruck and Silesia there are likewise coal mines which have been on fire for a long time. In Belgium, between Namur and Charleroi, at a place called Falizolle, the fire has been alight for many years. In the environs of Dudley, England, there was formerly a coal mine on fire. The snow melted in the gardens as soon as it touched the ground. They gathered three crops a year. Even tropical plants were cultivated ; and, as in the isle of Calypso, an eternal spring prevailed. In another Staffordshire colliery, the firing of which dates years back, and which is called by the inhabitants "Burning Hill," it was noticed, as at Dudley, that the snow melted on reaching the ground, and that the grass in the meadows was always green.

A Scotch Steam Brake.

The following is a description of the method of applying brakes by steam, for which a patent has been sought by J. STERLING, of Kilmarnock, Scotland. It appears to be somewhat similar to one tried in Chicago about a year ago : Steam from the locomotive boiler is used, and is conveyed by suitable piping under the carriages or wagons into cylinders, with one or more of which each carriage or wagon is provided. Each cylinder is fixed to the framing in a vertical position, and its piston rod is connected to the brake levers or wipers, the brakes being applied by admitting the steam under the piston to lift it. An escape valve is fitted into the bottom of each cylinder, and is loaded by a spring or otherwise to a pressure which, taking the area of the piston into account, is considered the maximum to which the brakes should in each case be subjected.

Road Locomotives.

A SYSTEM of road locomotion has recently been proposed by a projector in Paris, France, in which the locomotive, instead of being used as a means of traction only, is utilized as a source of motive power, to be applied to a number of trucks or wagons, each provided with one or more driving-wheels, operated by independent machinery supplied with power from the locomotive. In this manner each of the trucks is caused to drive itself, and may also assist in drawing the remainder. The inventor thus claims to utilize the adhesion of almost the whole of the train of trucks for ascending the steepest inclines, which, if his theory holds good in practice, may therefore be effected with the heaviest loads and under the most unfavorable circumstances.

Waterproof Paper.

THE ammonia oxide of copper is a solvent for silk, paper, and cellulose. If its action be limited to a few moments it converts the surfaces into a gelatinous mass ; and SCOFFERN proposes to employ this property to render the paper waterproof. If in the mill the endless sheet of paper is made to pass at a proper velocity through the ammonia copper solution, and is afterwards dried and pressed, the surface will be converted into a species of parchment, and will be water-tight. The rate of speed for the rollers must be a matter of experiment.

Dualin.

A CORRESPONDENT of the Rockland *Gazette*, Oct. 21st, writes : On Thursday and Friday of last week, Mr. CLEMENS HERSHEL, of Boston, made some very interesting and successful experiments in our lime rock quarries with *dualin*, a recently discovered powder possessing extraordinary force. The inventor, CARL DITTMAN, late an officer of the Prussian army, had intended to be present, but being unable to come, he secured the services of Mr. HERSHEL, an accomplished civil engineer, who has had considerable experience in the use of dualin.

Notice had been given at the different quarries of Mr. HERSHEL'S coming, and a request made that holes might be drilled in places most difficult to blast, in order to test the strength of the new explosive. Mr. JOSEPH MILLAY, an experienced quarryman in charge of the Tolman quarry, had a nearly perpendicular hole drilled in a part of the ledge, but slightly above the bottom of the quarry. He stated that ordinary powder used in this hole would not produce a successful blast. It was charged with dualin, after which it was filled with water, instead of the usual clay tamping, and exploded with a galvanic battery. On examination, the whole mass of stone was found to be loosened and detached. Several other holes were blasted with equally gratifying results, and then two cartridges of dualin were placed upon the top of a large piece of very hard, fine grained rock, containing from fourteen to fifteen tons, known among our quarrymen as the "devil's ledge." The dualin was covered with a few shovels-full of earth and exploded. To the astonishment of all present, the rock was broken into innumerable fragments.

Similar experiments were made in the Auhorn quarry, Engine quarry and Ulmer quarry. In the latter a hole had been drilled near the bottom of the high ledge in front of Major ULMER'S house. By accident or design, it inclined under the overhanging cliff, giving it a very strong hold upon the ledge. The quarrymen had blasted this hole repeatedly without the least success, and had given it up as useless ; yet the first blast with dualin forced out the entire mass of stone, throwing it halfway across the quarry. In this, as in all the other experiments made, it was quite evident that more force was developed by the dualin than was required to do the work, and that a less charge would have answered the purpose.

These trials were made in the presence of some of our most prominent citizens, and under the inspection of a large number of our most intelligent and skillful quarrymen. All concurred in the opinion that dualin possessed much greater strength than common gunpowder, and that, in several respects, its use in our quarries would be attended with greater expedition, economy and safety.

First, it can readily be used under water, which is found to be the best possible tamping, and this obviates the necessity for "claying out" wet holes, a very tedious and laborious process. Second, it will break large pieces of stone into fragments by simply exploding it upon the surface, without the labor of drilling holes, as is now done in the work known as "squibbing." Third, the great danger of drilling out holes which have been charged with powder and have failed from any cause to ignite, by which so many of our quarrymen have been maimed and killed, will entirely disappear. Fourth, there will be no danger whatever in applying the match when the charge is ready to be fired. Some of the parties using dualin in this country have expressed the opinion that it resulted in a saving of fifty per cent. when compared with common powder. It may be used dry as other powder and ignited with a common fuse, or it may be used under water, in which case a percussion cap and water-proof fuse are required. It varies in price from eighty cents to one dollar and twenty cents per pound, and in strength from five to fifteen times that of common gunpowder.

Composition of Chinese Lacquer-Work.

GENUINE Chinese lacquer-work is done over tin-foil, and consists of a mixture of two parts of copal and one of shellac molten together. When fluid, there are added two parts of boiled linseed oil ; and, after the vessel containing this mixture has been taken from the fire, there are gradually added ten parts of oil of turpentine. If color is required, gummi-gutta, dissolved in oil of turpentine, yields yellow, and dragon's blood, dissolved in the same liquid, yields red.

A REMARKABLE IRON DEPOSIT has been discovered on a mountain about twelve miles north of Laramie, Wyoming. The ore lies exposed upon the ground in great quantities, and the specimens which have been analyzed show a remarkable purity and excellence of character. The mountain on which it is found is a long ridge of land running nearly north and south, about 2,000 feet high, generally quite flat at the top, with long, sloping sides, about twenty miles wide on the top.

Architects' Convention.

AMERICAN INSTITUTE OF ARCHITECTS.

THE fourth annual convention of the American Institute of Architects commenced Wednesday afternoon last in the office of the Philadelphia Chapter, Athenæum Building, Sixth street, below Walnut. The session was opened at 3 o'clock, THOMAS U. WALTER, L.L. D., Vice President of the institute, in the chair. The exercises were inaugurated with the reading of the annual address by Mr. WALTER, of which the following is an abstract:

"The progress of the Institute during the past year has been decided and healthy. Its influence for good has been felt throughout the country, and its respectability as an exponent of a noble and honorable profession is all that we could desire. The difficulties encountered in the early years of our organization, arising from the vast distances intervening between the leading centres of civilization, have been obviated by the establishment in our leading cities of Chapters, all of which are in accord with each other and with the central head, thus imparting a purely national character to the institute, while none of the advantages of local organization are, in any degree, abridged. Four Chapters are already established, and it is understood that three more will shortly be organized. The subject of public competition in architecture will, no doubt, claim the consideration of the Convention. The public have rights as well as architects, and we must take care not to ignore the one while contending for the other. But public competition under premiums, the award of which devolves upon committees or commissioners who are wholly ignorant of the art upon which they sit in judgment, is always to be deprecated. There is no architect of genius who does not instinctively shrink from competitions which are open alike to the professional and the non-professional, and in which no provision is made for judging the competitors by their peers. There are, undoubtedly, grave difficulties connected with this question. We must meet them and solve them; and in approaching the subject we must do it in view of the public interests as well as the interests of the profession. It is gratifying to observe the constant improvement going on in the character of works executed by architects. In view of the ever-changing habits and customs of the times, and of the purposes of the buildings of the present day, it is obvious that the architectural developments of the past year will not suffer by comparison with those of any former period. We have nothing, it is true, to compare in solemn grandeur with the vast monuments that frown on the world from the shores of the prolific Nile—nothing to fill the mind with wonder and astonishment like the inimitable cathedrals of the middle ages, whose

> "Shapes minute
> At once distinct and blended boldly form
> One vast majestic whole."

Nothing to astonish mankind by its magnitude and its magnificence. The requirements of the present day are widely different from those of the past. It is the duty of architects to meet them by independent thought and study. The wholesale transfer of ancient and obsolete forms to modern uses is obviously inconsistent with the true principles of art. We are not constructing edifices for the accommodation of by-gone ages. As some of our buildings would seem to indicate, we work for the present and not for the past. The inspiration to which the works of architects of other times is addressed may be ours if we seek it; the thoughts of all ages, all peoples, are at our disposal, and we may gather wisdom from them. But we must remember that we build for the age in which we live, and that whatever we do should bear the impress of our time."

On motion, the following named gentlemen were appointed to act as the Auditing Committee for the ensuing year:—Messrs. A. J. BLOOR, NAPOLEON LE BRUN, of New York, and SAMUEL SLOAN, of Philadelphia, The treasurer's report was read, the consideration of which was postponed. The Board of Trustees and Committees on Examination, Education and Library and Publications submitted reports. Reports from the Chapters of Philadelphia, New York and Cincinnati were read and approved. On motion, the Convention adjourned until 7 o'clock.

EVENING SESSION.

The evening session of the Convention was opened at the appointed time, Vice President THOMAS U. WALTER, L.L. D., occupying the chair. A motion was adopted instructing the chair to appoint a committee to nominate officers. The chair accordingly appointed Messrs. VAN BRUNT, SCOFIELD, SIMS, WIGHT and HUNT to compose the committee. Mr. P. B. WIGHT, Secretary of the Convention, read the report of the Board of Trustees on Competition for Architectural Works. The Convention devoted the remaining portion of its evening session to the consideration of a schedule of terms regulating open and close competitions for architectural works proposed by the Board of Trustees, which, with slight amendments, was unanimously adopted.

The following is the schedule of terms regulating open and close competitions for architectural works, recommended to all architects, building committees, and proprietors throughout the country:

1. The instructions must not require more drawings or estimates than are necessary in order clearly to explain the design, and should require that all the designs submitted be drawn to a medium scale, which must be clearly defined, and that all perspectives required be drawn to the same scale as the geometrical drawings, and on a plane at the corner of the building nearest the point of sight; a deviation from which will cause their rejection.

2. In case the amount to be expended is limited, the instructions must state that an excess of ten per cent. on the expense of executing any design, over and above the sum mentioned, will exclude it from the competition; and in case the amount to be expended is not fixed, then the competitor may use his own discretion as to the costliness of the design which he makes.

3. A design will be excluded from the competition if sent in after the stated period, and if it contains deviations from the instructions. If, from any of the above reasons, all submitted designs are rejected, then the jury are bound to publish reasons which led to their verdict.

4. The period given for preparing the design must be long enough not only for perfecting a design and preparing the necessary drawings, but must make some allowance for the ordinary occupations of competitors. An explicit statement must be given as to the time when the decision on the merits of the designs is to be rendered, and that all designs shall be returned to the authors of the same. An architect's drawings are his own private property, unless paid for in which case they are for the sole use and benefit of his client; but the actual drawings still belong to the architect who made them.

5. The designs should be submitted to a Jury of experts, whose decision is to be final. One-half of the Jury should be architects, and, in case of an open competition for a public building, they should be selected by the Institute of Architects or its Board of Trustees, the other half to be appointed by the Building Committee or owner. The Jury must be named in the instructions, which they shall have sanctioned before publication. No person can be competent to serve as juror who submits a design, or is in any way interested in any design submitted, or who has not renounced all intention of participating in the execution of the work.

6. All designs submitted, in open competitions for public buildings, should be publicly exhibited two weeks before the decision is made.

7. In the case of open competitions the first premiums must not be less than the amount which the architect would have received had there been no competition, and at least an eqal amount should be divided among the other competitors, according to the merits of the designs submitted.

8. It is recommended that, in close competitions wherein the number of competitors is limited, a sum equal to the full value of one design be devided equally among the authors of all except the premiated design, which shall be compensated for as provided in the last preceding rule.

9. The instructions must state that in case the building is erected after any of the designs are submitted in competition, it must be given in charge of the author of the first premiated design, who is to be employed at the usual compensation; and if any other designs, or part of designs, are used, it can only be done with the consent of the authors of the same, and they must be compensated for the full value of the designs or parts of designs used, irrespective of the premiums that may have been awarded.

10. The premiums must be awarded, under all circumstances, for the designs which may have been admitted in competition.

11. It is recommended that, in the schemes of competition, it shall be provided that the names of the competitors shall not be known to the Jury.

The following resolution, offered by the Board of Trustees, was also adopted:

"*Resolved*, That a Special Committee of five be appointed by the chairman to compile a pamphlet defining the exact duties and responsibilities of architects, their relations to each other, to their clients, and to the various parties under their control; and to give definitions and explanations of the schedule of charge, and any additions to them that may be thought necessary; and to present the result of their deliberations to the next Convention of the Institute; such report to present what is, rather than what should be, the best practice of the profession."

The Board of Trustees were, on motion, requested to publish a large number of copies of the Schedule of Competition for general circulation.

The Institute then adjourned, to meet the following morning at 11 A. M.

SECOND DAY.

The Convention reassembled Wednesday morning, THOMAS U. WALTER, L. L. D., Vice-President, in the chair. The election of officers being the first business in order, the Committee on Nominations presented their report, recommending the following gentlemen for officers of the Institute for the ensuing year.

President, RICHARD UPJOHN, of New York; Treasurer, R. G. HATFIELD, of New York; Secretary, P. B. WIGHT, of New York; Secretary of Foreign Correspondence, HENRY A. SIMS, of Philadelphia; Librarian, JOSEPH IRELAND, of Cleveland; Trustees, CHARLES D. GAMBRILL, of New York; HENRY DUDLEY, of New York; JAMES RENWICK, of New York; JOHN D. HATCH, of New York.

Committee on Examinations.—RICHARD UPJOHN, of New York; R. G. HATFIELD, of New York; JAMES RENWICK, of New York; DETLEF LIENAU, of New York; and HENRY DUDLEY, of New York.

Committee on Education.—WILLIAM R. WARE, of Boston; EDWIN ANDERSON, of Cincinnati; GEORGE W. HEWITT, of Philadelphia; H. G. ISAACS, of St. Louis; and E. T. LITTELL, of New York.

Committee on Library and Publication.—E. T. LITTELL, of New York; LEVI T. SCOFIELD, of Cleveland; W. P. P. LONGFELLOW, of Washington; A. J. BLOOR, of New York: P. B. WIGHT, of New York.

The above officers were unanimously elected, with the exception of the Committee on Education, which, on motion of Mr. RUSSELL STURGIS, Jr., of New York, was altered, so as to be composed as follows: THOMAS U. WALTER, L. L. D., of Philadelphia; WM. R. WARE, of Boston; J. MCARTHUR, Jr., of Philadelphia; SAMUEL SLOAN, of Philadelphia; and GEORGE W. HEWITT, of Philadelphia.

Mr. H. VAN BRUNT, of Boston, presented a communication from the Boston Society of Architects, stating that the by-laws of the Society had been altered to conform to the requirements of the American Institute of Architects, and that it was the intention of that Society to ask that they be recognized as a Chapter of the Institute.

On motion, it was *Resolved*, That when this Convention adjourns, it adjourns to meet next year in Boston.

Invitations were read from the Directors of the Athenæum and the Historical Society of Pennsylvania, for the members of the Institute to visit their rooms: also from Messrs. CORNELIUS & SONS, to visit their factory. The invitations were accepted, and a vote of thanks tendered.

Mr. D. T. ATWOOD, of New York, then read a paper on "Technical Proportions in Architecture," at the close of which the morning session of the Convention adjourned.

AFTERNOON SESSION.

The Convention re-assembled at 3 o'clock.

On motion of Mr. HUNT, Mr. THOMAS U. WALTER, President of the Philadelphia Chapter, and Secretary of the American Institution of Architects, organized in 1836, was requested to prepare an historical sketch of that society and the present organization.

On motion, the Board of Trustees were instructed to enquire into the expediency of appointing a standing committee on foreign correspondence.

Mr. HUNT presented a form of contract, which he recommended to the use of architects in their engagements with their clients.

Mr. STURGES being called to the chair, Mr. WALTER moved that a committee of five be appointed by the Trustees, to prepare a form of contract to be used by the profession, and that the Trustees be empowered to employ counsel. The motion was unanimously carried.

Mr. WIGHT moved that the Philadelphia Chapter be tendered the thanks of the Convention for the use of their rooms for this meeting. Carried. The session then adjourned.

In the evening, the closing address to the Institute was delivered by Rev. W. H. FURNESS, D. D., at the lecture-room of the Franklin Institute. He commenced by declaring that he was not in any sense an architect, and had not been "crammed" with a single architectural term, with which to speak to this body. At the same time, he said, it was impossible for architects to exist without capitalists and builders; consequently, if the members of the profession expected to be successful in their art, they must win attention to it from those who, while they know little of art, desire to possess it. What art has a better right than architecture to be called a fine art? The only art that approaches nature, the ideas of architecture are unapproachable in grandeur; and a great deal of the criticism that is passed on the architect's art proves nothing but the ignorance of their critics. It is not understood that the true architect is in the highest sense of the term an artist, and, besides this, they are engaged perforce in the work of public instruction. They are street preachers, and we cannot evade their sermons. Architects have every reason to assert the dignity of their high calling and breathing of the true spirit of art. They will cease to repeat, but will create. Who can doubt that in this country, so richly blessed of Heaven, the weary age of imitation will come to an end, and that a brilliant age of creation will ensue?

On motion of Mr. WIGHT, the thanks of the Institute were tendered to Dr. FURNESS for his address; after which the Convention adjourned *sine die*.

Important New Mineral Fields near Edinburgh.

IN the year 1801 a discovery was made at Palacecraig, near Airdrie, from which may be dated the beginning of the immense fortunes of most of the Scotch iron-masters. It was in that year that Mr. DAVID MUSHET, then manager of Calder Iron Works, discovered the famous black-band iron-stone, and determined its great value as a source of metallic iron. The stimulus which that discovery, together with the invention and application subsequently of the hot-blast, gave to the iron-making industry of Scotland, soon made it pre-eminent over that of all other countries. Of late years the Airdrie district has been almost completely worked out, so far as its black-band iron-stone is concerned, and, in consequence, many persons have despaired of the Scotch iron trade maintaining the important position which it held for many years. Fortunately, however, there have been made, from time to time, new discoveries of black-band ore, which have materially assisted to keep the furnaces going, (and thus maintain the credit of "puir auld Scotland") though the native hæmatites of the country, of Cumberland, and of Spain, have also been largely pressed into the service of the Scotch iron-masters. So far as we are aware, however, there has been no discovery of mineral wealth in Scotland, since the time of Mr. MUSHET, that can at all compare in importance with the fields to which we now propose to direct attention.

They lie a short distance south of Edinburgh—from four to ten miles—in the picturesque valley of the North Esk, and almost parallel to the Pentland Hills. The district is interesting in a variety of ways. It contains the classic Hawthornden, where the poet DRUMMOND lived, and where BEN JOHNSON visited him. There is also the classic Roslin, famous for its chapel, with its brilliant specimen of Gothic architecture; for its ruined castle; and for the victories won there by the Scotch over the English in 1303. Old Woodhouselee, identified with the memories of HAMILTON of Bothwellhaugh and the Regent MURRAY, and the New Woodhouselee of the TYTLERS, are also within the district. Burdiehouse, with its great limestone quarries, the Roslin powder mills, and the famous North Esk paper mills, also lie in the district, and have much interest attaching to them. The probability is, however, that the district will soon be identified with the great mining and metallurgical industries of Scotland on a very extensive scale—to such an extent, indeed, as to throw some of the other features of interest quite into the shade.

Within the district there are to be found, in comparatively close proximity to each other, great stores of house and furnace coal, gas coal, excellent oil shale, exceedingly rich and pure black-band iron-stone, and an enormous deposit of limestone. So far as it has already been proved, it is found to extend, in a north-easterly direction, from the west of Penicuit to the east of Gilmerton, a distance of about eight miles. The principal proprietors of the land through which this mineral district extends are Sir GEORGE CLERK, Sir DAVID BAIRD, Mr. RICHARD TROTTER, and Sir SIMON LOCKHART, of Lee, in Lanarkshire. The only iron-masters who have concluded leases with one or other of these landed proprietors are the Shotts Iron Company and Glasgow Iron Company.

The Glasgow Iron Company have as yet only concluded a lease for some fifteen hundred acres in the vicinity of the village of Gilmerton. They have only quite lately taken their mineral field, but they are already progressing very rapidly in their explorations. An incline is at present being driven, about half a mile to the east of the village just named, close to the line of the projected Loanhead and Roslin Railway, to which we shall subsequently refer.

The Shotts Iron Company have for some time been gradually opening up the mineral fields which they have secured, and they have been working the iron-stone by means of an incline at Loanhead, and by which they are bringing the iron-stone to the surface at the rate of upwards of one hundred tons per day. The properties which they have leased extend from Loanhead to some distance west of Penicuik, the whole length being about six miles, and the width varying from one to three or four miles. A large portion of this area has now been proved, and the result of their *exploitation* is sufficient to justify us in affirming that the useful minerals contained in the North Esk Valley are almost fabulous, both in extent and value. On passing from Edinburgh to Loanhead by the highway, it is readily seen, by the manner in which the minerals crop to the surface, that the eruptive force which raised the Pentland hills must be credited with producing the tough-like arrangement or disposition of the minerals in question. They consist (1) of about twenty workable seams of common coal, the total thickness of which is about one hundred feet; (2) of two seams of first-class gas coal, one being about two feet, and the other eighteen inches in thickness, and both similar to the famous Lesmahagow gas coal, and yielding an excellent coke; (3) two seams of black-band iron-stone, one being about two feet nine inches, and the other about eighteen inches in thickness; (4) a seam of very valuable oil shale, fifteen inches thick, which is found over-lying the first-mentioned iron seam. Both the seams of black-band iron-stone are exceedingly rich and pure. Of the richness there can be no doubt, when it is mentioned that, in the calcined state, 32 cwt. are sufficient to yield one ton of pig iron.—*Glasgow Herald.*

Artificial Ice.—M. TOSELLI, writing to a foreign contemporary, states that actual experience has proved that the ice made by the process invented by him withstands the influence of a temperature far above the freezing-point of water better than natural ice, or than any other ice obtained by artificial means; and to illustrate this fact, the instance, properly proved, is brought forward, that a block of ice weighing twenty kilos, made by the author's process in eighteen minutes, and sent off from Paris to Algiers on the 30th of June last, arrived, properly packed, at its destination late in the afternoon of the 5th of July, and the block of ice then remaining still weighed ten kilos. The loss, by fusion, on a journey through a warm climate in the middle of summer was, therefore, only 8½ grms. per hour. One hundred kilos. of ice made by the author's process would require, under the same conditions of temperature, 49½ days to liquefy it; whereas one hundred kilos. of the ice artificially made by the process of M. TELLIER has been found to melt in six days under the same conditions. It appears that M. TOSELLI's apparatus renders ice very compact.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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The Pacific Press.

ONE of the most effective agencies in the rapid development of the material resources of the far West, has been the press. The activity and enterprise which characterize all American journalism have had full play on the Pacific slope and in the Rocky Mountains, in the great work of making known to the world the beauties and the treasures of newly opened Territories; and the manner in which this work has been performed claims our admiration.

Nothing could be more useful, for instance, than the periodical reviews of trade, commerce, manufactures and finance, furnished by the leading papers of San Francisco. They are at once widely comprehensive, and accurately true; and they afford successive pictures of progress, more forcible in their effect upon the observer than innumerable vague boasts or glowing prophecies.

Throughout the trans-Mississipppi States and Territories, there is an evident desire on the part of editors to assist in every way the settlement and development of the country. Of course, each newspaper fights bravely for its own locality, declaring war at once upon those who prefer some other place, and emphasizing vehemently all the favorable features in the domestic news. But we note with pleasure a general desire to avoid deceptive statements; a conviction that all our sanguine exaggerations and swindling falsehoods injure even the community and the interest they may have been calculated to benefit.

Some prominent papers keep members of the editorial corps constantly travelling, and writing letters descriptive of the industrial and social condition of the country. Such articles, for instance, as the excellent ones contributed by W. R. THOMAS of Denver, to the *Rocky Mountain News*, are exactly what both the citizens and their friends abroad desire to find in a local organ. We are impatient to find space occupied in a Western paper with stale clippings from Atlantic journals, while there is so much to be said, of novelty, interest and value, concerning the resources and activities of home.

The Pacific newspapers, moreover, are as a rule on the side of order, refinement and good morals. They encourage benevolent enterprises and social reforms, though they pander more than we could wish, to the vulgar love of satire and flippant ridicule. Many of them are truly independent, upright organs of free opinion, hostile to monopolies, political or commercial, and impervious to bribery.

There is one point where the press of these new communities is somewhat weak. It is reluctant to oppose the current of popular feeling. Fearless before monopolies, it is sometimes cowed by majorities. We do not underrate the difficulty of standing up against the apparent sentiments, or even interests, of one's own constituents; but we feel sure that open honesty would be the best, in the end, for all. We might adduce various examples, to make our meaning more clear; but we will confine ourselves to one.

The press of Nevada, for instance, is worthy of praise. The bench is highly respectable; the bar, no worse, we suppose, than other bars. But the juries of the State are notoriously and abominably corrupt. Sometimes by money, sometimes by sympathy with their own class, sometimes by the vague notion of plundering capital in the interest of labor, they are swayed from the course of justice. A series of verdicts rendered a few months ago in Austin, all contrary to the judicial declaration of the law, all unsupported by the evidence, all in defiance of the patents granted by the United States—were all in favor of piratical locators, and hostile to bona fide occupants and owners, because the latter were an Eastern company! The company was nearly ruined by these rascally verdicts; and its fate may be a warning to others.

The press should denounce such outrages persistently, vigorously and uncompromisingly. We have had occasion already to warn the citizens of Nevada that they are vitally interested in maintaining justice for all, and that they cannot expect the aid of capital for their home industry, if they deny protection to its rights in their domestic courts. Let their newspapers speak boldly to the same effect.

Meanwhile, it is our duty to warn capitalists that they cannot trust to the honesty of Nevada juries, until a salutary reform has taken place. The miserable stupidity of the district laws of the miners, the clashing decision of the courts, and the vague phraseology of the United States law on the subject of mining titles, leave the unfortunate litigant at the mercy of a jury, which it is too expensive to buy, and which, if disappointed in the hope of being bought, will decide against the representative of capital. A "company" seems to be considered fair game in our mining states. So long as this state of things continues, it is no wonder the miners call for "more capital"—and it is no wonder they don't get it! Capital naturally hesitates when it is called upon to purchase juries as well as mines. The fact is, Gentlemen of the Jury, you ought not to offer your immortal souls for sale at all; but if you do, then come down in your price to what they are worth, and the capitalist will not seriously feel the extra cost of justice.

And, Gentlemen of the Press, if you will flay these fellow-citizens of yours now and then, it will do them good.

The South African Diamond Fields.

THE excitement caused by the discovery of a new diamond field has doubtless led to a good deal of exaggeration on the part of the local press, as well as by correspondents writing from the vicinity of these rich discoveries. Surely no people on the face of the earth ought to be better cognizant of the fact that such discoveries always have been, and probably always will be exaggerated, than our own. Nearly a quarter of a century ago the reports from California concerning the newly-discovered gold fields, turned the heads of a considerable portion of our citizens. In fact the excitement at that time was so intense and general that very few—certainly very few of the young men of that day, escaped a more or less severe attack of what is commonly known as the gold-fever. Since that time each of the Territories has in turn been the subject of an excitement of the same kind, though of a milder type. The gold-fever in California drew thither people from all classes and grades of life, but of course the inducement was greater to those without any regular employment, and to that constantly increasing class which we term "dangerous." The prevalent idea was, that it was only necessary to have a shovel and a bag, and to reach the rich localities described, in order to shovel up gold enough in a few hours to fill the bag, start back to the settlements, and sell out. How far the reality of the hardships and privations of the miner's life fell short of this ideal, it is needless for us to describe.

At the same time, no one can deny that even the possibility of becoming rich rapidly and without any commensurate exertion is extremely fascinating, even when one is fully aware that the chances are decidedly against such a happy consummation. It is like the old lottery invitation to everybody to try their luck, and those who accepted the invitation were generally wiser and poorer. So the discovery of gold in California had for its immediate result a great deal more of misery than of happiness. The secondary result was, however, very different; a large and industrious population was attracted to a new and rich field, and a prosperous, and on the whole, law-abiding community, built up a great State on what had been a wilderness. May we not anticipate a similar result at the Cape of Good Hope?

We have as yet no account that we can consider perfectly reliable concerning the new diamond fields, though there can be no doubt that a number of large and valuable gems have been found. As a general thing the Cape Town press is much more moderate than is common under the circumstances. For instance, the Grahamstown *Journal* says:

"The discovery of the 'Star of South Africa,' now known at home, has been followed by that of other stones which, if not so valuable as that superb gem, are of great excellence and in large numbers. As the fields are in a country owned by no one who can substantiate his claim, there is no organization of labor, and there are no means of ascertaining the actual discoveries. Some keep their good fortune to themselves, and again there are cases in which a diamond is talked about until it becomes several diamonds. The custom returns will, after a while, give trustworthy statistics."

The following gives, perhaps, a more truthful picture of the state of feeling at the Cape:

"KING WILLIAM'S TOWN, Tuesday.—Considerable excitement was occasioned in town last evening by the arrival from the diamond fields of Mr. INNESS, with a magnificent gem of twenty-nine carats, and Mr. BERNARD LEE, with nine small diamonds, all without spot or blemish. Messrs. LEE and INNESS left for Grahamstown by passenger cart early this morning. The arrivals at the fields are one thousand per week."

The Alwal *Observer* says: "Our town was thrown into great excitement on Wednesday last by the arrival of Mr. VAN ROUN from the diamond fields, who announced the discovery by Captain EDWARDS of a diamond of 108 carats, valued at £100,000. BOND purchased four hundred diamonds in six days, one a real beauty, pure and bright, without flaws or spots, of forty carats, from the Phielside. In King William's Town numbers of townsmen talk of throwing up their quiet occupations and starting for the diamond fields at once. Mr. FOURLE has returned with a number of diamonds. He worked only fifteen days, and was very lucky. Another party from the free State have washed out a perfect gem, slightly-straw-colored, of 25¾ carats. Many have been successful in finding smaller stones, weighing from one to seven carats. Diggers at Hebron, Gong-Gong and Zritzikama have met with considerable success. The editor of the *Friend* has inspected the fields and reports favorably. He saw two hundred diamonds in BOND's possession, the greater portion perfect gems, the largest weighing 41½ carats. KEMINGTON & HOLMES, of Hope Town, have exhumed a beautiful stone of 30½ carats, perfect and of the first order."

From other sources we learn that a perfect exodus of the inhabitants of Cape Town has taken place, and as yet we have heard of no depradations and lawlessness, but we learn that a "Committee of Safety" has been established at the diggings. Concerning the excitement at the Cape, a correspondent of the *London Times* writes:

"All that is certain is that there the precious gems are on the surface and close to the surface, spread over an area of hundreds of square miles that were uninhabited and unnoticed until within the last two months, little frequented, even by wild game, as there is neither bush nor grass on the surface, and which (had there been any one claiming rights of ownership over it) might have been all purchased by any buyer to the great joy of seller, for a few shillings per thousand acres. There, nevertheless, the precious gems are, unearthed now and found every day by the simple process of washing and sieving the rubbish, and thither a population, with picks and shovels and rakes, is rapidly following from every—even the most distant—town of the colony. It is about four hundred miles from here, and about twice that distance from Cape Town. They are travelling for it either on foot or on horseback, or by horse-cart or mule-cart or ox-wagon. Partnership companies of from four persons to sixteen persons are leaving this little city every second or third day. The higher classes of gentry and the lower classes of working people are going together without distinction. The bricklayer who was working for me but a few days since at eight shillings per day—a respectable man and whose work is still unfinished—has thrown up all, leaves his wife and family behind, and is off next week. I speak this from my own personal experience, that your readers may judge from such little facts the wide-spread sensation that has been produced in this country. Two-thirds of our cathedral choir, belonging to various stations in life, have gone, and we fully expect to be soon reduced to sopranos. The principal coach builder of the town tells me to-day that he can do no more work; that all his men have this (Saturday) morning given him notice to leave forthwith. Many of the police are giving the required month's notice. All the laborers under the city corporation have given notice."

Viewing the mattter from this distance, we can only hope for permanent good to arise from the remote results of all this excitement. There will doubtless be many lucky ones, and of those we shall hear, but the unfortunate, who will constitute a much larger number, will be passed by in silence.

How Steel Rails are made in Swansea.

THIS was made patent to a distinguished company of some one hundred and fifty members of the Iron and Steel Institute of Great Britain, at their meeting in South Wales, on the 8th ult. The steel works were formerly used as silver works by Messrs. DILLWYN, RICHARDS, and Co., at Landore, but about two years ago they were adapted to the production of steel by Siemens' patent, and are now doing a flourishing trade extending at every point. The staple of the works is steel rails, for which there is a great demand, the Great Western Railway Company alone being capable of taking all that can at present be produced at the works. The process of manufacture is simple. Hematite pig iron is passed through puddling furnaces heated with gas at a high temperature. From these the iron is taken to steel melting furnaces, where it is made liquid, and cast into ingots. These are conveyed in a heated state to a steam hammer, weighing eight tons, each ingot being twelve cwt., two qrs., in weight. They are compressed by this means, then cut in pieces, and passed through iron rollers till they are attenuated to the necessary length and shape, when the ends are cut off by means of a circular saw while still at red heat, and the rail is finished. The smelting and heating are all carried on by means of gas. The mode of testing the rails is by means of a heavy blow from a hammer, or "monkey," suspended at heights varying according to the necessary test. In the present case, a rail was passed across, and a hammer eighteen cwt., was allowed to fall from a height of twenty-four feet. In the first test the rail was broken in two, but in the next it was bent only, and a second blow from the "monkey" straightened it again. There was not the slightest shadow of a fracture from the strain on the metal, and the test was pronounced by all present to be particularly satisfactory in every respect. It may be stated that the test required by the Great Western Railway is that of the same weight falling from an altitude of six feet only. The various processes of manufacture were carefully explained, and were viewed with interest by all present. Some specimens of steel wire were also shown, to illustrate the toughness of the metal.

Casting of a Large Cylinder at the Atlas Works, Cardiff.

AN unusually large casting has just been made at the above works, of which the Messrs. WINBY BROTHERS are the proprietors. The casting consisted of an immense cylinder, forming part of a large steam-hammer now in process of erection by the above firm, and was, we are happy to say, in every respect successful. The operation was witnessed with great interest by a numerous company of gentlemen, including several well-known engineers and contractors.

The cylinder will be bored and finished to the following dimensions: Diameter, 45 inches; stroke, 10 feet; thickness of metal, three inches. It has been cast with box-plate, steam-ways and steam-chest in one, and weights 18 tons. The iron was melted in two cupolas, and supplied with blast from one of ROOT's patent blowers. The time taken in melting was two hours and ten minutes, and the metal was run into the mould through a sluice from the reservoir in the remarkably short time of fifty-seven seconds.

The steam-hammer for which this cylinder is intended has been designed by Mr. MACPHERSON, of St. Petersburg, one of the proprietors of the Baltic Iron Works, in which establishment it is intended to be used for forging large guns and other heavy work. The entire hammer will weigh over one hundred tons, exclusive of the base and anvil block, and will be what is called a double-action steam-hammer, being one of the most powerful of the kind that has ever been manufactured.

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blasters are free from the poisonous effects of handling loose dynamite without India-rubber gloves.

These cartridges must fit in the bore-hole, and be firmly pressed in the same with a wooden ramrod; as they are soft and plastic, they are easily made to fill the whole space, which is necessary in order to obtain the full effect. A cartridge of the smallest size is placed on top, the explosion of which serves to set off the whole mass.

There are three ways to ignite the charge:

1. With common gunpowder. This is represented in FIG. 6. Five cartridges are placed on the bottom of the bore-hole, and on the top of these common black gunpowder is poured to the height of one or two inches, in which the end of a slow-match is placed, and the hole filled as usual with sand; this, however, must be firmly rammed down. If this sand is only loosely placed in the bore-hole, so that it can be displaced by the gunpowder charge, the latter will not transmit percussion enough downward through the whole mass of the dynamite, and the result will be that it will not explode, but burn slowly with a quiet flame.

It is a very peculiar and valuable property of the dynamite that an indispensable condition to its explosion is a powerful percussion through its whole mass. The simple ignition of a barrel by accident, so fatal in case of gunpowder, is with the much more powerful dynamite comparatively harmless. This has happened more than once; and it burned quietly, the only danger being the suffocating fumes evolved; however, it is infinitely easier for the workmen to get out of the way of these fumes than to shelter themselves against a sudden explosion of gunpowder.

The use of gunpowder for exploding the dynamite charge is, however, only resorted to in the absence of the following means:

2. With NOBEL'S safety-match. This is represented in FIG. 7. It is at the end provided with fulminating powder, inserted in the small cartridge placed on the top, as mentioned before; for this purpose, one end of the cartridge is opened, and the match so inserted that it does not touch the dynamite of the cartridge, since then the force of the match would be communicated to the dynamite before the fulminate had exploded, in which case a great deal of the force is lost, and more suffocating fumes (chiefly carbonic oxide) evolved, than by the regular simple explosion, The so prepared cartridge is then enveloped in paper, and tied in the right position to the safety-fuse, and lowered into the opening on the top of the charge without pressure; sand, earth, or even water, may be loosely poured on the top when the charge is ready to be ignited. (See FIG. 8.)

This method of igniting the charge seldom fails, is very simple and rapid. The safety-fuses are prepared beforehand by another person, and after the charges of dynamite are lowered, so as simply to touch the charge.

3. With frictional electricity.

This method is used with peculiar advantage in circumstances where simultaneous blastings of several charges is preferred.

The fuses used are of three kinds, those of the Engineer ABEGG, of Bohemia, made of sheet-iron, with iron wire conductors; of TRAULZ, in Vienna, made of paper and copper wire, and those of FARMER, in Boston, of wood and copper wire. The first are very cheap, and sold in Germany at the rate of one hundred and twenty for one dollar, and, are therefore, mostly used in the works near Vienna, where the comparative experiments were made. They are represented in Fig. 9. On a strip of thick paper, two thin iron wires are attached in the same manner as pins are attached to paper. Their upper ends are bent outward, while their lower ends are, with the paper, immersed in the pure fulminating powder contained in the bottom of a little cylinder of tinned sheet-iron (improperly called *tin* in our ordinary language.) The particular combination of the fulminate in a secret of the manufacturer, but it is no doubt of the same nature as the mixture of sulphuret of antimony and chlorate of potash, which likewise easily explodes by the electric spark. When the projecting ends of the iron wire are connected with the conducting wires of the electric machine, the electric discharge takes place between the lower ends of the wire through the mass of the fulminate, and so the whole is exploded.

The fuses of TRAUZL are made according to a similar principle, and represented in Fig. 10. They are more expensive, and consist of a paper envelope below, containing the fulminate, covered with a cork, through which two copper wires pass and touch the fulminate below, while the greater portion of their upward projecting ends are protected and isolated by a covering of vulcanized rubber or gutta-percha. The free extremities are attached, as in the other fuses, to the wires conducting the electricity; and these are attached along a stick so as to remain separate, when sunk into the bore-hole, till they touch the top of the dynamite charge. The filling is then poured on loosely, and the electric discharge passed, after taking the proper precautions.

In case the hole is filled with water in place of sand, the conducting-wires must be isolated with a covering of gutta-percha, or by placing the wires in two separate grooves in the stick, and filling it up with hard fat or some other non-conducting material, in order to prevent the electric discharge from passing in any other place than the route intended, namely, through the mass of the fulminate.

Experience has shown that the conducting-wire outside the hole does not require careful isolation. It may lie loosely on the rock, or be suspended from branches of trees, etc.

The Boston fuse is similar but simpler. It is only a small oval capsule of wood, filled with the fulminate, in which the free ends of two copper wires terminate. They are firmly attached to the wood, and their very long projecting ends are covered with an isolating material.

The electric machine used is of the frictional kind, and costs in Germany only $24. Such a machine will ignite, in dry weather, from 8 to 12, and in wet weather, from 6 to 8, charges at once—all the fuses being connected, so that the same discharge has to pass through all of them in succession. The velocity of the electricity, as is well known, is so great as to be practically instantaneous for the short distance between the different blasts, so that they all explode at the same instant.

In this country, small frictional electric machines are made, in which the disk and Leyden jar are entirely enclosed in a hermetically-sealed box of vulcanized India-rubber, so as to be independent of the state of the atmosphere. Without such precautions, friction-machines are utterly useless in rainy weather or in damp localities, as is well known to all experienced in this speciality. These American machines are made of different sizes, the smallest occupying no more room than the large boxes used by surveyors, containing 100 feet of tape, wound up by a small crank.

MR. ABEGG has occupied himself extensively with the business of rock-blasting, the construction of boring-machines, the manufacture of cartridges, fuses, etc., and the results arrived at by him in regard to the comparative merits of the different methods, the expenses attendant upon each. etc., are very valuable.

He found that the effect obtained by the combined action of the dynaamite and the electric fuse is on an average double that obtained by the common blasting method, using dynamite and the gunpowder fuse, or NOBEL'S safety-fuse. For this reason, the electric method has been exclusively adopted in the operations near Vienna, and in many other localities. The effect is so violent, and single pieces of rock are projected with so much force to great distances, that extraordinary precautions are required for protection of the laborers in case this method of blasting is adopted.

The explosions are accompanied by a very loud report, followed by the noise of the fragments of rock falling back, and a pungent odor, which is not injurious to health. In the works near Vienna, it is reported that no sickness among the laborers has been observed. In the works at the Hoosac tunnel, in this country, the laborers have often suffered from the poisonous effects of the odor of the nitro-glycerine or dynamite, (which are essentially the same thing, the latter being only a mixture of the former with amorphous silex, in order to solidify it.) The symptoms are violent pains in the back of the head and neck, which are magically relieved by the use of strong good coffee, this being the regularly recognized antidote. Hence coffee has come quite a favorite drink among those who have to use nitro-glycerine, dynamite, etc.

Polytechnic Club of the American Institute.

Meeting held at the rooms of the Association, Oct. 27, 1870. PROF. S. D. TILLMAN in the cha'r.

PRESIDENT TILLMAN read the following scientific notes:

THE HOT BLAST FOR BLOWPIPE PURPOSES.—Mr. W. SKEY has given in the *London Chemical News* the results of his experiments in testing the effects of substituting a hot blast for a cold one, as heretofore used, for the production of the well-known blow-pipe flame, which seems to show that a flame so produced has its thermal and illuminating power very greatly augmented, In his experiments the temperature of the blast was, approximately, 500° F.; the diameter of the jet was one-thirtieth of an inch, and the combustible for receiving the blast was stearin. This flame manifested a very decided superiority over the common blow-pipe flame: substances difficult to fuse in the latter—magnetite, potash-feldspar, mica—readily yielded under these circumstances; while thick glass tubes, half an inch in diameter, and hard German glass tubes, were tractable to an eminent degree. Substances for the fusion of which the hydro-oxygen flame or some equivalent of it in heating power, is said to be indispensable, also yielded before the blow-pipe flame thus urged; for instance, platinum, pipe-clay, fire-clay, agate, opal, flint. Alumina only appeared to vitrify, while crystallized quartz could not be fused to a globule; their splinters, however, curled round upon themselves like scolozite, showing that the melting point was almost reached. It appears from this that a very small amount of some foreign substances exercise a marked effect upon the fusibility of silica, agate, opal, etc., being only a little less pure than rock crystal, though so readily fusible in this flame. The minimum temperature of the flame is estimated at 4596° F., and as the actual temperature of Hare's hydro-oxygen and lime light is estimated to be only 2,000° F., the author suggests that air thus heated might be substituted for oxygen gas. As this heating of the air would involve the use of a furnace, the improvement could not be conveniently applied to the portable lime-light apparatus now in extensive use.

DR. BRADLEY.—It seems perfectly reasonable to suppose that whatever heat is previously communicated to the air by which the flame is produced would be saved; for there must be a certain heat before the oxygen can unite, and if that heat is supplied in advance, the flame will be more intense.

MR. GODWIN.—That appears so plain as to require no discussion.

THE PRESIDENT.—The only objection to it is, that it requires a furnace to heat the air; and of course for many purposes it would be inconvenient to prepare the apparatus to heat the air. In using the blow-pipe on a large scale, it will no doubt be found very economical.

HORSE-SHOEING—THE NEW METHOD.—At a late meeting of the Highland Society at Dumfries, Scotland. Mons. CHARLIER, by special invitation explained the new method of horse-shoeing, invented by his father, a veterinary surgeon at Paris, which has been used with great success in France for five years on horses employed in different services, and has received the sanction of the Imperial Agricultural Society. He said, substantially, a good system of shoeing has long been sought for; many would even no longer shoe the horse, to avoid the numberless defects of the usual mode. But the shoe is to this day the only way of preventing the wear of the foot; we must, therefore, try to reduce the size of the shoe as much as possible in reforming it. Our shoeing answers this universal want, being more natural or rather less artificial than any other, being more simple and rational. Seen in its ensemble, it is quite different from all other shoes known hitherto, on account of—1st. The whole strength is left to the bare foot; also its whole form and whole function by never paring the foot, never touching the frog, nor the sole, nor the bars. 2nd. The new method of preparing the foot with new instruments to receive the shoe. 3rd. The new fittings of the shoe round the hoof, this alone allowing the pressure of the frog on the ground. 4th. No bevelling. 5th. Its elasticity. 6th. It narrowness, resting only on the width of the crust. 7th. Its lightness, being about one-third the weight of the ordinary shoe. 8th. The new manner of forging the shoe—stamping and nailing it. A square, or nearly square, little bar of iron is turned cold. in a very short time, or hot; one man alone can stamp it with two rounded punches. The shape and direction of the nail-holes are particular, necessitated by the unusual thickness and narrowness of the shoe. The exterior of the hole is a rounded oval; the hole is funnel-shaped; the upper orifice is square. The nail has exactly the same shape—a head of lengthened cone shape, a neck strong and solid, and a square blade. The nail thus stops up the hole hermetically. With these conditions, the new shoe, of good quality of iron, is very solid on the foot—an important advantage, especially for hunters. Six, seven, or eight holes have different directions, according to the inclination of the hoof; they are nearly straight toward the toe. A shoe with well-stamped holes can be nailed without danger of injuring living parts, the hole being a guide to the nail. 9th. No caulkins, nor hooks, nor toe-pieces. There is no need of caulkins; the frog is a natural caulkin on the slippery ground, sustaining the tendons instead of straining them. In case of frost, only two movable nail-caulkings are fixed toward the heels of the shoe; the toe forms a kind of hook by its narrowness and the inner angle of the shoe. These nail-caulkins can be fixed on by any one, not being in the horn, and, owing to the thickness of the shoe, are solid. They are taken off as soon as they become useless, being even hurtful on hard and level ground. In fine, the new shoe is not difficult to use, and no more liable to accidents than the ordinary shoe; it takes less time to forge it—a single man making 80 to 100 shoes per day; no longer time to fit it to the foot, it can be fitted cold as well as warm, and is suitable to all shapes of feet; it lasts a sufficient length of time, and is no more expensive than the common shoe. It is an orthopedic and pathological shoe, sufficient, frequently alone, to cure corns, contracted feet, and other diseases, being susceptible of modification according to the worst feet; and when the instruction of farriers is extended, it will be known and applied easily everywhere.

RECORDING STEAM GAUGES.

The PRESIDENT: It will be remembered that Mr. EDSON exhibited apparatus here a year ago for recording the pressure in a steam boiler, and that there was much discussion about it at that time. Mr. EDSON had made some improvements in his apparatus, and will now exhibit the improved Recording Steam Gauge.

Mr. J. B. EDSON produced one of the instruments and said: This gauge is operated by a system of diaphragm springs, three sets of which are put together in pairs, so as to operate like a pair of bellows. In that way we get three times the travel from the pressure of the steam itself, and three times the power to operate the recording mechanism. In the ordinary gauges, a single diaphragm is employed, the motion being multiplied by the apparatus; but the power is inadequate to overcome the friction of the pencil necessary to make a visible record. Applying here a pressure, to take the place of the pressure of the steam, you will see that when we reach a certain point, which can be regulated at pleasure, an alarm bell is rung. Here is also a dial and pointer showing the pressure at any moment. The whole apparatus is locked up, so that it cannot be tampered with. There is a pawl here which moves only in one way, which gives motion to the revolving drum only when the pressure decreases. I at first caused it to move the paper when the pressure was increasing; but the objection to that was that the friction affected the pressure by one or two pounds. The paper is carried by the drum, and forms a record, the pencil making its position, which will last for ninety days. So long as the pressure increases the pencil is moved upward, making a perpendicular mark; but as soon as the pressure begins to decrease the paper moves forward, making an oblique descending line. The alarm bell will ring when the steam gets too high, whether the engine is moving or not; but it must be wound up whenever it runs down. It rings for ten minutes, giving ample notice of danger.

DR. BRADLEY: The principle is the same with that of the aneroid barometer. There will certainly be a great saving of coal from the constant recording of the pressure; and by and by, when it is found that no explosions occur where this gauge is in use, it will be adopted as a safegnard also.

Mr. J. B. EDSON: By keeping this record we are enabled to distinguish between those firemen who neglect their work and those who feed their fires regularly. When in the naval service, I made extracts from the logs, and contrasted the amount of fuel required by different engineers to do a given amount of work, and I was surprised by the results. I could trace a watch right through, and find a saving of ten or fifteen per cent. in the consumption of coal. When they were burning forty or fifty tons of coal per day, this would amount to a great deal. In some of our factories large amounts of coal are burned, and the proprietors hardly consider what a saving might be made. If the coal does not last, they blame the coal, when it may be the fault of the firemen. If a record is kept, and the firemen know it, they will be induced to be more watchful of their fires; or if they are not, the engineer will know which are the men to be replaced.

MR. M. B. EDSON.—I have been at work upon this invention for four or five years; and a year ago last December we presented the instrument here in the form it had then. It will show an appreciation of its usefulness for me to state, that during the last few months I have obtained the approvals and signatures of nearly all the fire, life, and marine insurance companies doing business in the city of New York, representing at least $350,000,000 of capital, and also of promiuent steamship owners, mechanical and civil engineers, merchants and others. When we consider how many lives are constantly imperilled by the neglect of firemen and engineers, is it too much to ask that Congress should make it obligatory to use upon all steam vessels mechanical means for constantly recording the pressure in the steam boiler? It is certainly remarkable that a hundred years should have elapsed since the invention of WATT before a steam gauge was invented which would automatically record upon charts the degree of pressure. Such

a record will render steam a better servant than it now is, and will prevent its obtaining a mastery over us.

SMITH'S CLOTHES WRINGER.

Mr. C. S. HARVELL exhibited the clothes-wringer invented by GILBERT SMITH. It consists of a framework to be placed over the tub, having a network rope tube to be filled with the clothes, and a handle to be turned, which twists the tube from one end, shortening it and reducing its diameter, so as powerfully to squeeze out the water without injury to the fabric.

Mr. J. B. EDSON stated that, from an examination of this wringer, he was satisfied that it was durable and a valuable substitute for the much more expensive rubber wringers in common use. The rubber wringers have thus far had no serious competition in the market.

THE PRESIDENT.—Will this wring clothes as fast as the other?

MR. EDSON.—No, sir; I think not.

MR. HARVELL.—We claim that a washing of clothes can be wrung out with this wringer in one-half the time it would take a roller machine to do the same work. We can throw in a large sheet or half a dozen pillow-cases or shirts, hap-hazard, give a few turns, and the work is done; while it would take twelve or fourteen turns to pass a sheet through rollers.

MR. EDSON.—This wringer has the advantage that it is not so hard on buttons as the rubber wringer; but I should hardly think it would operate as rapidly, because its action is intermittent and the other is continuous.

LABOR-SAVING HOOP MACHINE.

Mr. A. MCALPINE exhibited a model of an improved machine for shaving barrel hoops. It makes two thousand revolutions per minute, and the hoop is moved three-eighths of an inch to each revolution, so that it will shave either straight or crooked hoops at the rate of sixty feet, running measure, per minute The machine could be seen in operation at the American Institute Fair.

ON THE DETERIORATION OF COAL BY ATMOSPHERIC INFLUENCES.

DR. ADOLPH OTT read the following paper:

In the year 1863 Herr GRUNDMANN, of Tarnowitz, in Germany, published experiments on the deterioration of soft coal. According to these experiments, it appeared that a long exposure to the air did not alter the specific weight of coal nor the amount of water contained in it. Yet it seemed that the percentage of ashes was thereby considerably increased. At the beginning of the experiments it was found that a certain kind of coal yielded 4.5 per cent.; after two months' exposure, 6.2; after five months, 10.4, and after nine months, 10.8. As it is likely that the absolute quantity of mineral ingredients in a coal remains the same, no matter how long it is exposed, GRUNDMANN concluded that the coal underwent a process of slow combustion, taking up oxygen and giving off the volatile products of oxidation. Coal which, after nine months' exposure, yielded 10.8 per cent. of ashes, would thus have lost 58.21 per cent in weight, namely, from 1000 pounds of coal only 418 pounds would remain after the stated time. It is evident that these statements caused the greatest attention among coal producers as well as consumers. They called forth considerable discussion in this Society; some distrusted the reliability of the experiments, others were enthusiastic in their praises of the triumphs of science. In 1866, however, the administration of the State Railway of Hanover, justly appreciating the importance of the subject, instituted controlling trials, which were mostly made by Director REDER, then in Osnabrück, now in Berlin. These experiments led to the following results: In three cases in which the coals had not grown hot, the weight had remained the same; in three others in which they had become warm, they increased in weight, instead of having decreased. REDER, who was then not aware of the fact that coal absorbs oxygen at ordinary temperatures, supposed that he had to ascribe the just mentioned results to an error in the method of observation.

Up to the present year no further experiments were made in this direction. A few months ago, however, Dr. E. RICHTER, of the Mining School in Waldenburg, Germany, has again taken up the subject, and gives, in a late number of the *Polytechnic Journal* of DINGLER, the results of his investigations. RICHTER justly declares the process of deterioration as one of chemical and physical change, by which the value of the fuel as a heating and illuminating material is more or less depreciated. He considers the conclusions of GRUNDMANN as based on an erroneous method of investigation. "Nothing is easier," says he, than "to determine the amount of ashes in a given sample of coal, but it is very difficult to select samples from one hundred or one thousand tons of coal which will represent the average amount of the entire map. The errors arising from this inaccuracy must evidently be the greater the smaller the amount of ashes." The following is condensed from his report:

I. The deterioration of coal is the result of a combined action of heat and the absorption of oxygen, which on the one hand combines with a part of the carbon and hydrogen to form carbonic acid and water, and on the other enters directly into the composition of the fuel.

II. The process of deterioration commences with an absorption of oxygen, which generally decreases in time. At ordinary temperatures, and with most coals, absorption and oxidation are going on so slow that, even within one year, no change can be detected in the composition of the coal.

III. As long as the temperature does not exceed 340° F., no perceptible loss of weight takes place; on the contrary, it has been ascertained that coals often increase in weight, which is to be the result of an absorption of oxygen.

GRUNDMANN himself asserts that the volume of a heap of coal which has grown warm does not decrease, and that the specific weight remains nearly the same. If it were true that such a heap would loose half of its substance, the specific gravity of the remaining coal would just be one-half of the original one; or, a railroad car which holds ten tons of fresh coal, would only hold five of the decomposed one. This, however, is contradictory to all experiences. It has been adduced, that the earthy appearance which some coals present after long exposure to air and moisture, is the result of a loss in weight; but this is not the fact. Every lump, as well as a whole heap, may be compared to a porous body impregnated with a solution of salt. This salt goes to the surface in the same proportion as the water evaporates, until it covers the entire surface. According to the observations of RICHTER, the earthy covering consisted, in a coal of Waldenburg, of sulphate of lime, which had been formed by the action of moisture and air on the pyrites and the carbonate of lime, which latter substance seems to be a constant ingredient.

The decrease in heating and illuminating power, as well as in the liability to cake, to which coals are subject by deterioration, is explained by the absolute and relative decrease in carbon and hydrogen, and by the absolute increase of oxygen. As to the heating power, RICHTER asserts, that at ordinary temperatures the same will, in a year, only amount to a few per cents.; that if the temperature in the heaps remains at 170° or 180° F. for a few weeks, it will reach this amount after that time, and if the temperature exceeds 212° F., the stated loss will be perceptible in a few days.

The coking quality of coal, according to FLECK, depends upon the amount of hydrogen it contains, and it may be shown that the capability to coke becomes less if hydrogen is given off and oxygen absorbed. This takes place in heating, as well as in the process of deterioration.

According to RICHTER, the generation of heat is the *conditio sine qua non* of decomposition of coal. He refers in his paper to a certain class of coals—to those liable to self-combustion—that are mostly subject to deterioration, but without describing them farther. I infer from his paper that its deterioration depends rather upon the physical condition of a coal than on its chemical composition, and shall endeavor to settle these points by experiments. I do not regard the investigations referred to as altogether satisfactory, but considered them of sufficient importance to call attention to. In conclusion, I would invite the chemists of this society to institute experiments on what seems to me a very important subject.

DR. BRADLEY.—Is there a similar effect upon charcoal?

DR. OTT.—These experiments only refer to mineral coal.

THE PRESIDENT.—I suppose, too, that they only refer to soft coal. I hardly see how they can apply to our anthracite coal. We had a discussion upon this subject two years ago. DR. OTT proposes to institute still further experiments, and asks the co-operation of other members of the Institute.

DR. BRADLEY.—Is the spontaneous combustion which sometimes takes place in large quantities of coal, probably caused by such a process as is described in this paper?

DR. OTT.—Certain coals are more liable to spontaneous combustion than others. The cause is not explained. I suppose it depends rather upon the hydrogen they contain than upon the sulphur.

MR. J. B. EDSON.—Tropical heat, as well as the rapid rains of tropical climates, seems to have a serious effect upon anthracite coal. I recellect that coal which was shipped in the West Indies, after an exposure of five years to the weather, we found it almost impossible to burn. This was government coal, placed in the care of our consul at Cape Haytien, for the benefit of our cruising vessels. It was totally inefficient and useless from the mere effect of a constant exposure to the sun and rains. I have observed that in South America and in tropical climates generally, they are more particular about protecting their coal than we are. It is stored in substantial buildings, whereas we hardly think of putting a shed over it. Hard coal seems to be as liable to spontaneous combustion as soft coal. I have known anthracite coal to take fire in iron vessels and to burn for weeks before it could be put out. Whether it took place from the motion of the vessel or from spontaneous combustion, I do not know.

THE PRESIDENT.—Hard coal will not take fire except at a high temperature, probably 1,000°, or about that; and no mere pressure would cause that amount of heat.

MR. EDSON.—Might it not possibly take place from the motion of the vessel shifting a large body of coal?

THE PRESIDENT.—I suppose a great deal of hard coal contains a small percentage of hydrogen and of sulphur, which would be more easily inflamed.

DR. OTT.—It seems to me nearly settled that it is not moisture so much as heat that causes spontaneous combustion; and hard coal seems to deport itself like charcoal, having the property of storing up large quantities of oxygen, mingled, perhaps, with some nitrogen.

MR. EDSON.—The hard coal I referred to had this peculiarity, that it was very hard; twice as hard as any other. It also had a sulphurous appearance.

THE PRESIDENT.—Charcoal has the power of absorbing many times its own volume of gases; mostly nitrogen, but a great deal of oxygen also. I do not see how hard coal could absorb much; but it might, when broken up into fine particles. There is a good deal of mystery yet about the whole subject.

MR. PARTRIDGE.—Two years ago, I had occasion to observe another peculiarity of coal exposed to the weather. It was chestnut coal, part of which was exposed to the snow, and the rest of which was dry. The gases from the coal which was exposed to the snow attacked the iron like powerful acids, and before the winter was out, the rods, which were from one-eighth to one-fourth of an inch in diameter, were entirely destroyed, so that some of them were not larger than needles. They were renewed and again almost entirely destroyed; and the sheet iron, Russia iron, was eaten through that winter the second time. We noticed that the eating was very rapid whenever we were using coal that had been wet. At the same time the amount of ash appeared to be greater, although we didn't weigh it.

DR. BRADLEY.—I apprehend that if we should subject a piece of the hardest coal to a very powerful microscope, we should find that it would develope infinite interstices, and appear to be a very spongy substance. Every molecule of matter is in motion. Nature knows no such thing as perfect rest, anywhere in any of her departments. Adjourned.

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108,951.—PAD AND TRUNK-LOCK.—Andy M. Adams, Washington, D. C.

108,952.—ELECTRO-MAGNETIC-LOCK.—Henry Arden, St. Louis, Mo.

108,953.—FANNING-MILL.—Henry K. Averill, New Oregon, Iowa.

108,954.—PUMP.—William C. Barker, Ypsilanti, Mich.

108,955, antedated October 28, 1870.—GEARING FOR METAL PLANERS.—William M. Barr, Williamsport, Pa.

108,956.—HEAD-REST.—James S. Bartlett, Warsaw, N. Y.

108,957.—COMPOUND FOR PIPES, TILES, SIDEWALKS, &C.—Wm. A. Battersby, Williamsburg, N. Y., assignor to himself, Timothy R. Crawford, Robert Brown and John Anderson.

108,958.—SPARK-CATCHER AND CONSUMER.—Darwin Beach, Oshkosh, Wis.

108,959.—SUCKER-ROD COUPLING.—James H. Beatty, Franklin, assignor to John Adams and Thaddeus W. Brigham, Venango county, Pa.

108,960.—BEE-HIVE.—Joseph Behe, Carroliton, Pa.

108,961.—HAT AND COAT-RACK.—George T. Benson, Jersey City, N. J.

108,962, antedated October 28, 1870.—ORE-WASHER.—Hezekiah Bradford, Reading, Pa.

108,963.—LINIMENT.—James C. Branch and Hugh P. Quin, Washington, Ga.

108,964, antedated November 5, 1870.—PERMUTATION-LOCK.—Franklin H. Brown, Chicago, Ill., assignor to himself and Benjamin B. Wiley, same place.

108,965.—APPARATUS FOR COOLING THE VAPORS OF OXIDE OF ZINC.—John E. Burrows, Newark, N. J.

108,966.—SPRING-BED BOTTOM.—Thomas A. Carl, Nashville, Tenn.

108,967.—STEERING MECHANISM FOR VELOCIPEDE.—A. Christian, New York, N. Y.

108,968.—SASH-HOLDER.—Charles B. Clark, Buffalo, N. Y.

108,969.—CHURN.—Timothy Coffield and B. Egli, Natrona, Pa.

108,970.—WATER-WHEEL.—Frederick G. Coggin, Burlington, Vt.

108,971.—GATE-LATCH.—Calvin Cole, Ithaca, N. Y.

108,972.—SHADE FOR LAMP AND GAS-BURNERS.—M. C. Collins, Chelsea, Mass.

108,973.—FOLDING-CHAIR.—Thomas B. Comins, Jr., Lowell, Mass.

108,974.—STRAW-CUTTER.—Edward A. Cralle, Jr., Brickland, Vt.

108,975.—PLOW.—Robert S. Crockett, Rossville, S. C.

108,976.—PORTABLE ELEVATOR AND CONVEYER.—H. C. Crosby, Chicago, Ill.

108,977.—DEVICE FOR KEYING PAVING-BLOCKS.—Perley D. Cummings, Portland, Me.

108,978.—STEAM-RADIATOR.—Lewis S. Daniels, Foxborough, Mass.

108,979.—PLOW.—Andrew Day, Crystal Springs, Miss.

108,980.—TYPE-SETTING MACHINE.—Manoel de la Peña, New York, N. Y., assignor to J. G. O Guimaraes, same place.

108,981.—SAW-MILL.—Moses Delude, Carrolton, Mich.

108,982.—VALVE-GEAR FOR STEAM-ENGINE.—William B. Doddridge, Hebron, Ind.

108,983, antedated October 29, 1870.—PRESERVING MEAT, FISH, OYSTERS, &C.—Julius Edmund Detch, Washington, D. C.

108,984.—BEE-HIVE.—James A. Douglass, Altoona, Pa.

108,985, antedated November 7, 1870.—IN-SOLE FOR MANUFACTURING SHOES.—Charles S. Dunbrack, Swampscott, Mass.

108,986, antedated October 28, 1870.—SCREW-SPIKE FOR RAILROADS.—Alpheus C. Dunn and Isaac L. Dunn, New York, N. Y.

108,987.—LOCK-NUT.—Philip Dyer, Jr., Abram Parker and W. B. Way, Pontiac, Mich.

108,988.—SEED-PLANTER.—James M. Elliott, Winnsborough, S. C.

108,989.—LUNCH-BOX.—James Elson, Northampton, Mass.

108,990.—BLANK FOR SAW-TEETH.—James E. Emerson, Trenton, N. J.

108,991.—ASH-SIFTER.—William S. Esty and Isaac S. Clough, Brooklyn, N. Y.

108,992.—WOOD-BENDING MACHINE.—Joshua Fipps, New Albany Ind.

108,993.—CHILDREN'S CARRIAGE.—Isaac Newton Forrester, Bridgeport, Conn.

108,994.—WINDOW-SASH WEIGHT.—John T. Foster, Jersey City, N. J., assignor to William Stanley, Englewood, N. J.

108,995.—HORSE-COLLAR PAD.—John Fraser, Dowagiac, Mich.

108,996.—ATTACHMENT TO CULTIVATOR-FRAMES TO WAGON AXLE-TREES.—David Fuller, Fullersburg, Ind.

108,997, antedated October 28, 1870.—BEE-HIVE.—Gilbert G. Gabrion, Olive, Mich.

108,998.—BED-SPRING.—D'Alembert T. Gale, Fort Wayne, Ind.

108,999.—PISTON-PACKING.—John Gates, Portland, Oregon.

109,000.—COMPOSITION FOR PENCILS.—William Geller, New York, N. Y.

109,001.—LATERALLY-SLIDING THROTTLE-VALVE.—William Glass, Brooklyn, N. Y.

109,002.—ROOFING-COMPOSITION.—James P. Godfrey, Manchester, N. H.

109,003.—REED-ORGAN.—Horatio N. Goodwin, Syracuse, N. Y.

109,004.—STEAM-TRAP.—Morrill C. Gove, Lowell, Mass.

109,005.—LATH-MACHINE.—James T. Hall, Alma, Mich., assignor to himself and Isaac Pierce, same place.

109,006.—PENDULUM CRUSHING-MILL.—James Hart, Sweeden Center, N. Y.

109,007.—AWNING.—William Hildebrand, Fort Wayne, Ind.

109,008.—BOX-SCRAPER.—F. B. Hill, East New York, N. Y.

109,009.—PREPARATION OF PEAT.—Charles E. L. Holmes, New York, N. Y.

109,010, antedated October 28, 1870.—LIQUID GLUE.—William Harwitz, New York, N. Y.

109,011.—ROCKER-CHAIR.—Charles H. Hudson and J. Bowker, New York, N. Y., assignors to Charles H. Hudson.

109,012.—EXTENSION SCAFFOLD.—J. Hughes, New Berne, N. C.

109,013.—GOVERNOR FOR STEAM-ENGINE.—Reuben K. Huntoon, Wakefield, assignor to J. A. Lynch, Boston, Mass.

109,014.—FIRE-CRACKER PISTOL OR HOLDER.—R. Hutchinson, Newark, N. J.

109,015.—MACHINE FOR EXTRACTING STUMPS.—J. A. Jenkins, Clarksville, Mo.

109,016.—SPINNING WHEEL.—Thomas Johnson, Ruby Post Office, assignor to himself and George Adams, Watrousville, Mich.

109,017.—COAT AND HAT-RACK.—James M. Keep, New York, N. Y.

109,018.—COMPOSITION FOR COATING BEARINGS.—Peter J. Kelley, New York, N. Y.

109,019, antedated October 22, 1870.—DIGGING-MACHINE FOR AGRICULTURAL PURPOSES.—Alfred Lafayette Kennedy, Philadelphia, Pa.

109,020.—DUMPING-CAR.—Sidney D. King, Middletown, N. Y., assignor to himself and James M. Welch, Bradford, Pa.

109,021.—FLUX FOR WORKING METALS AND MINERALS.—Solomon W. Kirk, Philadelphia, Pa., assignor to himself and Henry Thomas, same place.

109,022.—FIRE-PLACE STOVE.—Philip Klotz, Baltimore Md.

109,023.—MEDIUM FOR TURNING MUSIC SHEETS.—Albert Kraft, Berlin, Prussia, assignor to F. G. Utassy & Co., New York City.

109,024.—BUTTON-FASTENER.—Frank M. La Boiteaux, College Hill, Ohio.

109,025.—REMOVING DIES MADE FROM ANILINE, &c., FROM PORTIONS OF FABRICS.—Jean Lambert, Jr., New York, N. Y., assignor to Gustave Bourgade, same place.

109,026.—PARLOR-SKATE.—Tilman F. Leak, Montgomery, Ala.

109,027.—COLORING AND PRESERVING WOOD.—Frederick Lear, St Louis, Mo.

109,028.—WELL-BORING APPARATUS.—Noah H. Lindley, Bridgeport, Conn.

109,029.—DOUBLE AND SINGLE-TREE ATTACHMENT FOR STREET-CAR.—James F. Lowe, Louisville, Ky,

109,030.—WASHING AND TRANSPORTING SAND.—D. B. Mallory, Mystic Bridge, Conn.

109,031, antedated October 28, 1870.—DEVICE FOR FASTENING DESKS, SEATS, &c., to FLOORS.—John D. McAuliff, St. Louis, Mo.

100,032.—HORSE HAY-FORK.—William W. McFaddin, Ennisville, Pa.

109,033.—SPRING FOR WAGON.—Alexander W. McKown, Honesdale, Pa.

109,034.—BRICK MACHINE.—William Mendham and Cyrus Chambers, Jr., Philadelphia, Pa., assignors to Edwin Chambers and Cyrus Chambers, Jr., same place.

109,035.—ANIMAL-TRAP.—John B. Merriman and George B. Lewis, Plantsville, Conn., said Lewis assigns his right to said Merriman.

109,036.—FENCE.—Uriah D. Mihills, Fond Du Lac, Wis.

109,037.—PLANE.—Ellis H. Morris, Salem, Ohio.

109,038.—TOOL-HANDLE.—Edgar Murray, New York City, assignor to Charles W. Dunlap, Brooklyn, N. Y.

108,039.—SETTING BOILER.—Charles Neames, New Orleans, La.

109,040.—MACHINE FOR SCOURING THE EYES OF NEEDLES.—H. A. Nettleton and Edwin R. Lawton, West Cheshire, Conn.

109,041.—COMBINED BARROW AND TURNIP-DRILL.—Albert M. Newland, Olivet, Mich.

109,042, antedated October 27, 1870.—HYDRAULIC-APPARATUS.—Nicholas Nolan, New York, N. Y.

109,043.—STOVE-PIPE GRATE.—Joseph O'Mallep, Montreal, Canada.

109,044.—PIN-CUSHION.—Marcus Ormsbee, Brooklyn, N. Y.

109,045.—APPARATUS FOR TOWING CANAL-BOATS.—Sidney W. Palmer and Josiah Foreman Palmer, Auburn, New York.

109,046, antedated October 29, 1870.—MACHINE FOR DRESSING MILLSTONE.—James Pepler, Bath, England.

109,047.—PITMEN.—Charles H. Perkins, Providence, R. I., assignor to Perkins Sheet-Iron Company, same place.

109,048.—DEVICE FOR OPERATING PLOWS.—James O. Potter, Rousseville, Pa.

109,049.—TOP OF GAS AND WATER STOP-COCK BOXES.—Wm. W. Pullis, St. Louis, Mo., assignor to Thomas R. Pullis and John Pullis, same place.

109,050.—PORTABLE CRADLE OR CRIB.—Daniel M. Reynolds, Chicago, Ill.

109,051.—TABLE.—Daniel M. Reynolds, Chicago, Ill.

109,052.—SAW-MILL.—Benjamin F. Richardson and D. Richardson, Martinsburg, Iowa.

109,053.—BALANCE SLIDE-VALVE.—Alexander K. Rider, York, N. Y., assignor to himself, Cornelius H. Delamater and George H. Reynolds, same place.

108,054.—LAMP-HEATING APPARATUS.—A. Rittenhouse, Philadelphia, Pa.

108,055.—HORSESHOES.—John S. Robertson, Wood End, near Cathcart, Scotland.

108,056.—VENTILATOR.—William F. Ross, Davenport, Iowa.

109,057.—PUMP.—Martin Van Buren Rowley, Worcester, N. Y.

109,058, antedated October 26, 1870.—STOOL AND TRAVELLING BAG.—John Salisbury and Benjamin Wilbur, Scituate, R. I.

109,059.—DYE-TUB.—T. Sampson, Providence, R. I.

109,060.—SCROLL-SAW.—August M. Schilling, Chicago, Ill.

109,061.—CHURN-DASHER.—Levi Scott, Burgettstown, Pa.

109,062.—HARVESTER.—Allen Sherwood and C. Sherwood, Auburn, N. Y.

109,063.—MILL-GEARING.—Henry Shoemaker and John Alexander McClintock, Perry, Ill.

109,064.—METALLURGIC GAS-FURNACE.—Charles W. Siemens, Westminister, England.

109,065.—METHOD OF CUTTING BOOT-PACKS.—Warren G. Slater, Hart, Mich.

109,066.—THIMBLE-SKEIN AND BOX FOR VEHICLES.—Thomas Smart, Jr., Brockville, Canada, assignor to himself and E. Smart, Pittsburg, Pa.

109,067.—SEWER CATCH-BASIN COVER.—Henry Smith, Jr., Milwaukee, Wis.

109,068.—DRYING AND PRESERVING APPLES.—Marshall P. Smith, Baltimore, Md.

109,069.—CHAIN WATER-WHEEL.—William M. Starr, Washington, D. C.

109,070.—BUTTER-PRINTER.—William C. Stern and James W. Robinson, London Grove, Pa.

109,071.—BARREL-FILLER.—F. Stitzel, Louisville, Ky.

109,072.—HAT-FINISHING MACHINE.—George W. Stout, Newark, N. J., assignor to New York Hat-Finishing Company.

109,073.—CORNER-TROWEL.—Sumner F. Streeter, Bernardston, Mass.

109,074.—LATCH.—Addison A. Stuart, Plainville, Iowa, assignor to himself and J. D. Eddy, same place.

109,075, antedated October 29, 1870.—RELISHING-MACHINE FOR TENONING SASH.—George L. Sullivan and Edward Lippincott, Chicago, Ill.

109,076.—ADJUSTABLE COAT-PATTERN.—George P. Sweezy, Riverhead, N. Y.

109,077.—MACHINE FOR LAYING CHANNELS IN BOOTS AND SHOES.—Seth D. Tripp, Lynn, Mass.

109,078.—BORING MACHINE.—Andrew J. Truxell, Lynchburg, Va.

109,079.—COMBINED CENTER AND LATHE-DOG.—A. J. Truxell, Lynchburg, Va.

109,080.—IRON FOR LINING FIRE-POT.—Edward A. Tuttle, Williamsburg, N. Y.

109,081.—COOK-ROOM REFRIGERATOR AND CONDENSER.—Presley D. Van Deventer, Wright City, Mo.

106,082.—CULTIVATOR-RAKE.—James T. Van Wyck, Poughkeepsie, N. Y.

109,083.—FLOATING VELOCIPEDE.—Carl O. Wederkinch and A. Starkweather, Boston, Mass.

109,084.—BRUSH.—John Lake Whiting, Boston, Mass.

109,085.—PAPER-FILE.—Frank W. Whitney, Brooklyn, N. Y.

109,086.—STEAM-GAUGE AND SAFETY-VALVE.—I. N. Whittlesey, Mount Vernon, Ind.

109,087.—CURTAIN-FIXTURE.—John H. Wilhelm, Chicago, Ill.

109,088.—DEVICE FOR UNLOADING WAGONS.—Isaac Williams, Westfield, Ind.

109,089.—BRICK-MACHINE.—John R. Williams, Taunton, Mass.

109,090.—POT FOR GLUE, PAINT, &c.—John J. Wilson, New York, N. Y.

109,091.—DITCHING AND GRADING MACHINE.—Hiram A. Winter, Windsor, Ill.

109,092, antedated October 22, 1870.—MACHINE FOR BOOKING TOBACCO LEAVES.—Joseph Wise, Elizabeth, N. J.

109,093.—POTATO-DIGGER.—Albert R. Wixom, Farmington, Mich.

109,094, antedated October 29, 1870.—MACHINE FOR BENDING IRON-PIPE FOR WELDING.—Elon G. Woodworth, John Brawdy and F. Merithew, Birmingham, Pa.

109,095.—SPRING FOR VEHICLES.—Emos Wright, Lee county, Iowa.

109,096.—DOOR-CHECK.—Chas. P. Young, Attleborough, Mass.

109,097.—SELF-ACTING WAGON-BRAKE.—Anthony Zink, Lancaster, Pa.

109,098.—TREE-PROTECTOR.—Abraham S. Adams, Waynesborough, Pa.

109,099.—WATER-WHEEL.—Benjamin J. Barber, Balston Spa, N. Y.

109,100.—PENCIL-SHARPENER.—Asahel G. Batchelder, Lowell, Mass.

109,101.—CALL-BELL AND CASTER-STAND.—Frederick Anton Blatterlien, West Meriden, Conn.

109,102.—CLAMPING MOVABLE SEAT FOR CARRIAGES.—Sylvester W. Beach, Ypsilanti, Mich.

109,103.—STEAM-TRAP.—William H. Bechtel, Philadelphia, Pa.

109,104.—OYSTER-DREDGE WINDER.—Charles T. Belbin, Baltimore, Md,

109,105.—MALT-KILN.—Charles Philipp Berekhemer, Cincinnati, Ohio.

109,106.—NECK-TIE FASTENING.—George W. Bishop, Baltimore, Md., assignor to himself and John McFarland, same place.

109,107.—DINING-TABLE.—David Boardman, Columbus, Ind.

109,108.—HARNESS-SADDLE.—Valentine Borst, New York, N. Y.

109,109.—TRANSPOSING SCALE FOR TEACHING MUSIC.—Parish G. Bryan, Louisville, Ky.

109,110.—DRAWER FOR CABINET FURNITURE.—Levi Burnell, Milwaukee, Wis.

109,111.—POTATO-DIGGING MACHINE.—Lemuel Cochran, Penn's Grove, N. J.

109,112.—ANIMAL-TRAP.—John Cosolowsky, Titusville, Pa.

109,113.—CONDENSER FOR STEAM-PUMPS.—Wm. Craig, Newark, N. J., and Henry L. Brevoort, Brooklyn, N. Y.

109,114, antedated October 29, 1870.—HORSE-POWER.—Rufus W. Crouse, Westminister, Md.

109,115.—APPARATUS FOR FITTING AND SETTING AXLES.—James Cunningham, Rochester, N. Y.

109,116.—SUPPORTING PROP FOR FOLDING BUGGY-TOPS.—Alexander Dom, Mount Healthy, Ohio.

109,117.—ROTARY-PUMP.—John Doyle, Hoboken, N. J., and Timothy Augustine Martin, New York, N. Y.

109,118.—LUBRICATOR.—Isidore Dreyfus, New York, N. Y.

109,119.—RAILWAY SLEEPING-CAR.—Joseph S. Du Bois, St. Louis, Mo., assignor to himself and Thomas Dorwin, Leavenworth, Kansas.

109,120.—APPARATUS FOR PARLOR-CROQUET.—A. P. Eastman, Washington, D. C.

109,121.—VISE.—James Findlay, Toronto, Canada, assignor to himself and William Smellie, same place.

109,122.—BOOTS.—Charles H. Fitch, Worcester, Mass.

109,123.—DOVETAILING-MACHINE.—Crawford Staples Griffin and Josiah Wells Wilkins, Stockton, Me.

109,124.—COTTON-SCRAPER AND CHOPPER.—Nathan M. Hale. Cleborne, Texas.

109,125.—MANUFACTURE OF WHITE-LEAD.—Robert F. Hatfield, New York, N. Y., assignor to "Hannen Lead Company," same place.

109,126.—PRESERVING ALE AND BEER ON DRAUGHT.—Cornelius E. Haynes, Boston, Mass.

109,127, antedated October 29, 1870.—FENCE.—Charles Nelson Hitchcock and Henry Pendleton Taylor Wilson, Canton, Miss.

109,128.—GUN-LOCK.—Cyrus B. Holden, Worcester, Mass., assignor to himself and Isaac Fiske, same place.

109,129, antedated October, 29, 1870.—CULTIVATOR.—H. Howe, Oneonta, N. Y.

109,130.—FLOWER-STAND.—Hiland H. Kendrick, Fulton, N. Y.

109,131.—BURNING HYDROCARBON.—Isaac Kendrick, Philadelphia, Pa.

109,132.—EXCAVATING SCOOP.—Oscar P. Kniffin, Clinton, Ct., assignor to himself and H. A Lyne, same place.

109,133.—NECK-TIE RETAINER.—Henry Laurence, New Orleans, La.

109,134.—BUTTON-FASTENING.—Edwin F. Lee, New York, N. Y.

109,135, antedated November 4, 1870.—HIDE-BEAMING MACHINE.—Patrick Lennox, Lynn, Mass.

109,136.—GANG-PLOW.—Wm. Mason, Independence, Oregon.

109,137.—VARIABLE CUT-OFF APPARATUS.—Thomas May, Brooklyn, N. Y.

109,138.—PITMAN.—John H. McGowan, Cincinnati, Ohio.

109,139.—WOOD-PAVEMENT.—D. McKenzie, Brooklyn, N. Y.

109,140.—CHEESE-VAT—Henry W. Millar, Utica, N. Y.

109,141.—RAILWAY-SWITCH.—John Miner and Silas Merrick, New Brighton, Pa.

109,142.—CONDENSER FOR GAS-WORKS.—Peter Munzinger, Philadelphia, Pa.

109,143.—RAILROAD-CAR-STOVE.—John Oliphant, Spring Hill Furnace, Pa., assignor to F. H. Oliphant, Jr., same place.

109,144.—NUT-CRACKER.—Joshua Pusey, Philadelphia, Pa.

109,145.—BIT FOR HARNESS.—Benjamin S. Roberts, New Haven, Conn., assignor to O. B. North & Co., same place.

109,146.—SAWING-MACHINE.—David S. Shanabrook, Green Castle, Pa.

109,147.—TIRE-SHRINKER.—Christian S. Sherk, Grantville, Pa.

109,148.—APPARATUS FOR CARBURETING AIR.—Jacob D. Spang, Dayton, Ohio.

109,149.—BOILER-FEEDER AND LOW-WATER DETECTOR.—John L. Starkey, Worcester, Mass.

109,150.—BRICK-KILN.—Edward C. Sterling, St. Louis, Mo.

109,151.—MACHINE FOR FILLING BARRELS.—John L. Stewart, Philadelphia, Pa.

109,152.—COFFEE-POT.—John F. Still, West Farms, N. Y.

109,153.—CIGAR-CUTTING MACHINE.—Lucius S. Stimson, deceased, by Harriet N. Stimson, administratrix, Lowell, Mass., assignor to himself and Moses S. Moulton, same place; said Moulton assignor to Nelson F. Libby.

109,154.—COUNTERSINK.—Delay F. Sutton, Toledo, Ohio.

109,155.—GRAIN-SEPARATOR.—Frank Switt and Miles Standish, Hudson, Mich.

109,156.—GARMENT-HOLDER.—Benjamin Van Campen Taylor, Newark, N. J.

109,157.—CORN-HULLER, SHELLER, AND FEED-CUTTER.—Tower Thomasson, Calhoun, Mo.

109,158.—ROCK-DRILLING MACHINE.—Nathaniel Tucker, Levi Williams and Henry H. Coppock, Pleasant Hill, Ohio.

109,159.—JOURNAL-BOX FOR CARS.—Ernest V. Jeinsen, Omaha, Nebraska.

109,160.—PRIVY.—William Jacob Warren, Philadelphia, Pa.

109,161.—TYPE-WRITING MACHINE.—Charles A. Washburn, San Francisco, Cal.

109,162.—APPARATUS FOR GRINDING THE KNIVES OF MOWING MACHINES.—Dwight F. Welsh, Nevada, Ohio.

109,163.—MECHANICAL-MOVEMENT.—J. H. Whitney, Rochester, Minn.

109,164.—STOP-MOTION GEAR-WHEEL.—John H. Whitney, Rochester, Minn.

109,165.—SWING.—Lucius Winston, Pontiac, Ill.

REISSUES.

4,174.—MACHINE FOR HUSKING CORN.—L. A. Aspinwall, Albany, N. Y.—Patent No. 101,809, dated April 12, 1870; reissue No. 4,099, dated August 16, 1870.

4,175.—HEATING-STOVE.—Silas Hoffman La Rue, Allentown, Pa.—Patent No. 105,816, dated July 26, 1870.

4,176.—DRIP-FILTERING OIL-FOUNTAIN.—Eli F. Wilder, Lowell, Mass.—Patent No. 101,069, dated March 22, 1870; antedated September 22, 1869.

DESIGNS.

4,457.—ORNAMENTATION OF GLASSWARE.—James S. Atterbury and Thomas B. Atterbury, Pittsburg, Pa.

4,458.—BUCKLE.—Joseph I. Bell, Bell's Bridge, Cal.

4,459.—WATCH-PLATE.—Florentine A. Jones, Boston, Mass.

4,460.—BOX FOR THE TOP OF BUREAUS.—Cheney Kilburn, Philadelphia, Pa., assignor to Kilburn & Gates, same place.

4,461.—RUSTIC FENCE.—John Millae, Paterson, N. J.

4,462.—PICTURE-FRAME.—Joseph H. Saunders, Johnson, R. I.

4,463.—TOASTER AND BROILER.—P. B. Sheldon, Rochester, N. Y.

4,464.—RANGE OR STOVE.—N. S. Vedder, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to J. L. Mott, New York City.

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53.—WHITE-LEAD.—Brooklyn White Lead Company, New York.

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56.—COSMOLINE—A PRODUCT OF PETROLEUM.—Edwin F. Houghton, Philadelphia, Pa.

57.—TABLE-SAUCE.—William King, Springfield, Ill.

58.—PREPARATION FOR THE HAIR.—Joseph Lloyd Martin, Baltimore, Md.

59.—SOAP.—Alexander Warfield, Philadelphia, Pa.

60.—SUPERPHOSPHATE.—Wattson & Clark, Philadelphia, Pa.

EXTENSIONS.

HARVEY B. INGHAM, of Camptown, Pa.—Letters Patent No. 15,978, dated October 28, 1856; antedated June 24, 1856.

TOBIAS J. KINDLEBERGER, of Eaton, Ohio.—Letters Patent No. 12,958, dated May 29, 1855; reissue No. 2,332, dated August 14, 1866.

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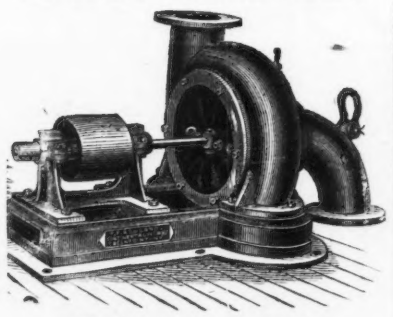

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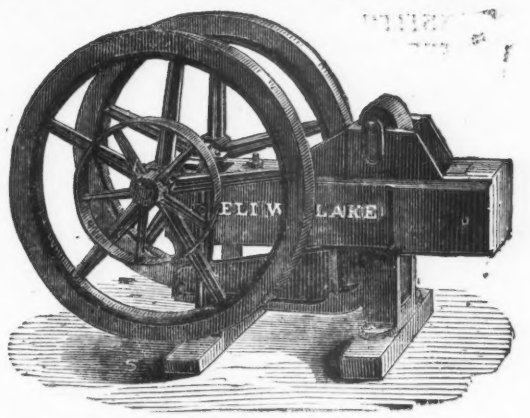

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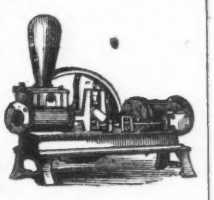

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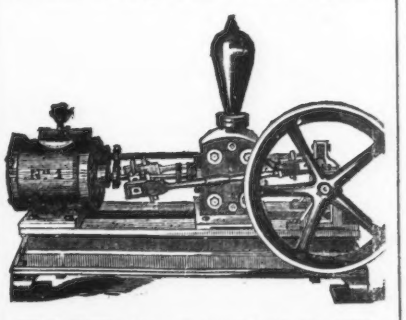

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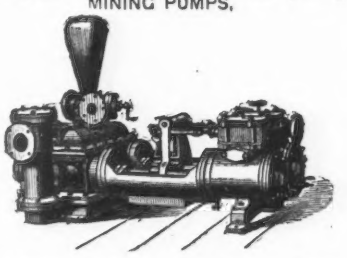

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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
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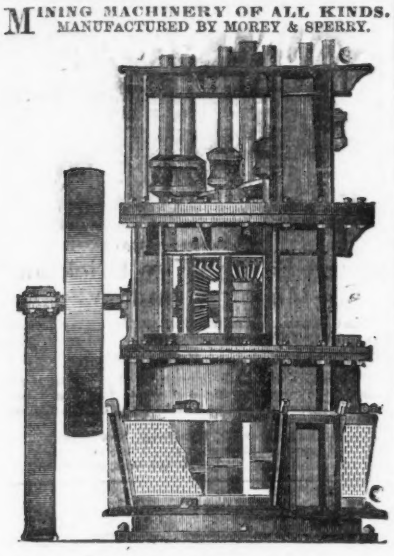

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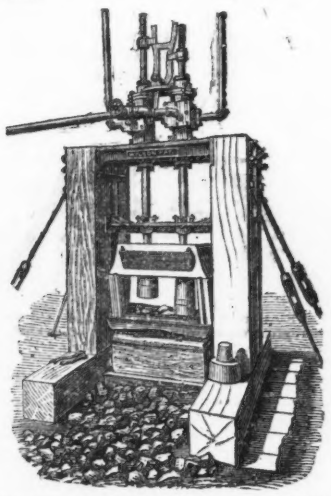

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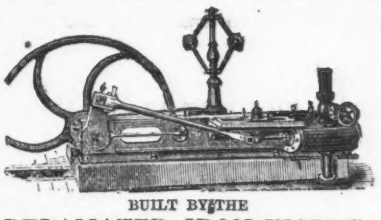

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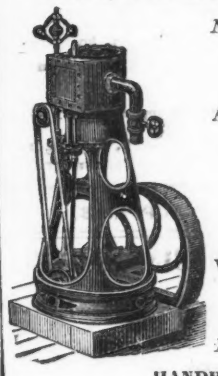

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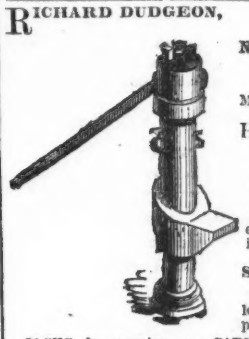

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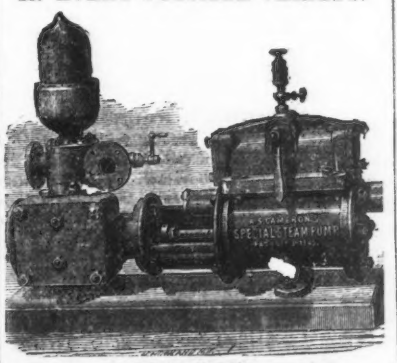

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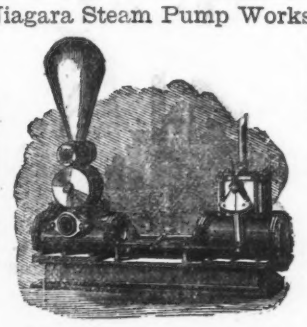

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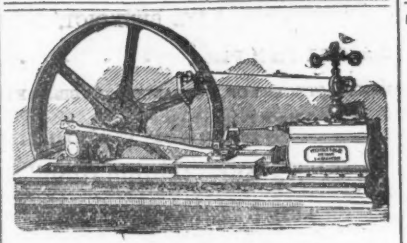

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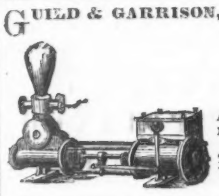

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